Ambient Air Quality Monitoring
Opportunity and Warm Springs Sites
Third Quarter of 2009

Prepared for

Anaconda Deer Lodge County

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1.0 INTRODUCTION

This quarterly report documents the ambient air quality monitoring program conducted by Kuipers & Associates on behalf of Anaconda Deer Lodge County at Opportunity and Warm Springs locations adjacent to the Atlantic Richfield Lower Waste Management Area. The months of July through September 2009 are included in this quarterly report, with a more detailed data summary in the monthly reports.

Objectives of this quarterly report include the following:

- Summarize the PM10 and Total Suspended Particulate (TSP) data on a quarterly basis and compare to applicable standards.
- Compare daily average TSP values recorded by the Opportunity Site against the PM10 values reported by the Atlantic Richfield Company's South Site.
- Present summarized meteorological data for the quarter.
- Present summarized results for ambient dust sampling conducted during the quarter.
- Present the Data Quality Summary (PM10, TSP and meteorological).
    - Review the hourly data according to the Environmental Protection Agency's Air Quality System Null Data Qualifier Codes.
    - Format hourly PM10 and TSP data for each month to fit the Environmental Protection Agency's Air Quality System raw data template.

Figure 1 shows the ADLC monitoring locations in Opportunity and Warm Springs, and the Atlantic Richfield Company’s South Site monitoring location.


ADLC Warm Springs PM10
ARCO North PM10
ADLC Opportunity TSP
ARCO South PM10
Feet
0 625 1,250 2,500 3,750 5,000
N
Water & Environmental Technologies
Anaconda Deer Lodge County
Air Quality Monitoring points
Figure 1

2.0 PM10 AND TSP DATA SUMMARY

The Met One E-BAM portable PM10 monitor at Warm Springs and the TSP monitor at Opportunity collected continuous hourly data at both locations from July 1 through September 30.

During the period of operation, data recovery was 99.4% at Opportunity and 97.1% at Warm Springs. Detailed ambient air quality monitoring results for the third quarter of 2009 are summarized in the July, August and September monthly reports prepared by Kuipers & Associates. A general discussion of ambient air quality monitoring data from the third quarter of 2009 is provided in the following sections. All PM10 and TSP data are reported at Local temperature and pressure (LTP) conditions.

2.1 Opportunity Site

At the Opportunity location daily average TSP concentrations ranged from 6 $\mu g/m^3$ to 116 $\mu g/m^3$ with an average of 28 $\mu g/m^3$ throughout the third quarter. The maximum daily average TSP reading of 116 $\mu g/m^3$ was observed on July 20. Winds were light and primarily from the northeast during the highest concentrations on that day, but several above-average hourly concentrations on July 20 occurred with light south-to-southeast winds. Therefore, while it appears that LWMA activities were the greatest contributing source, other local sources may have contributed significantly. Sampling was not conducted by the adjacent ARCO South PM10 monitor on that day, so no comparison could be made between it and the ADLC E-BAM sampler. There is considerable hourly variability on many days; on average the maximum daily one-hour concentration was 116 $\mu g/m^3$ in July, 84 $\mu g/m^3$ in August and 116 $\mu g/m^3$ in September. Daily average TSP concentrations for the quarter are presented in Figure 2 for the Opportunity monitoring site, and also in Appendix A.

Currently, there is no ambient air quality standard for TSP. However, all daily average TSP results for the third quarter of 2009 at Opportunity were well below the historical 24-hour Montana Ambient Air Quality Standard of 200 $\mu g/m^3$.

No Opportunity TSP data from the third quarter was rejected or omitted for quality assurance or quality control check results. Minor data losses occurred due to maintenance activities and power outages.

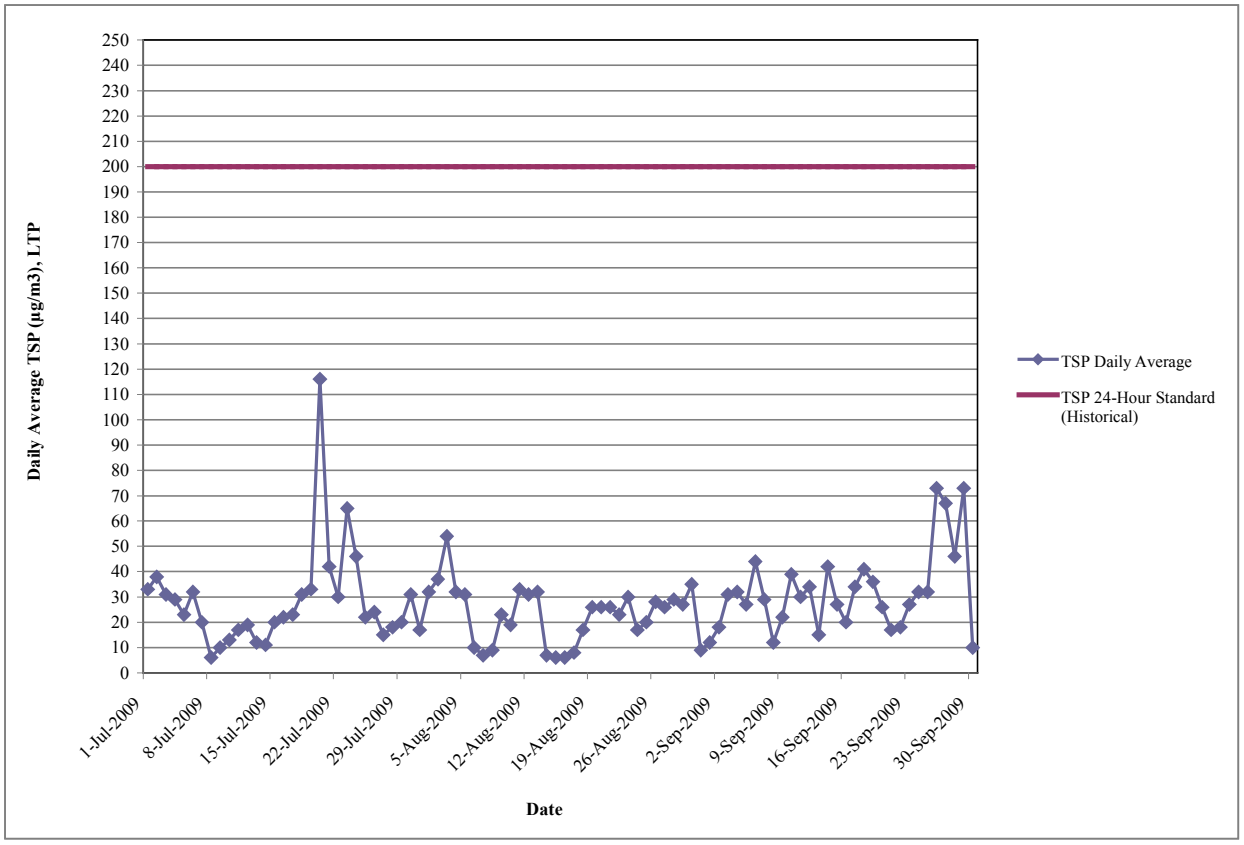

FIGURE 2– OPPORTUNITY SITE DAILY AVERAGE TSP CONCENTRATION

2.2 Warm Springs Site

At the Warm Springs location daily average PM10 concentrations ranged from 1 µg/m^3 to 21 µg/m^3 with a quarterly average of 10 µg/m^3. The maximum daily average PM10 reading of 21 µg/m^3 was observed on September 29. The highest hourly concentrations on September 29 were accompanied by fairly strong southwest winds, which ordinarily would indicate an impact from the LWMA. However, high TSP concentrations were noted at the Opportunity site on the same date, suggesting a regional event caused by windy conditions. There is considerable hourly variability on many days; on average the maximum daily one-hour concentration was 33 µg/m^3 in July, 30 µg/m^3 in August, and 33 µg/m^3 in September. Daily PM10 average concentrations for the third quarter are presented in Figure 3 for the Warm Springs monitoring site, and also in Appendix A.

All daily average PM10 results for the third quarter of 2009 at Warm Springs were well below the 24-hour Montana Ambient Air Quality Standard of 150 µg/m^3. No Warm Springs PM10 data from the third quarter was rejected or omitted for quality assurance or quality control reasons. Minor data losses occurred due to maintenance activities and power outages. Additionally, a total of 64 hours of PM10 data were lost in July because of failure of the E-BAM unit's AC power supply converter.

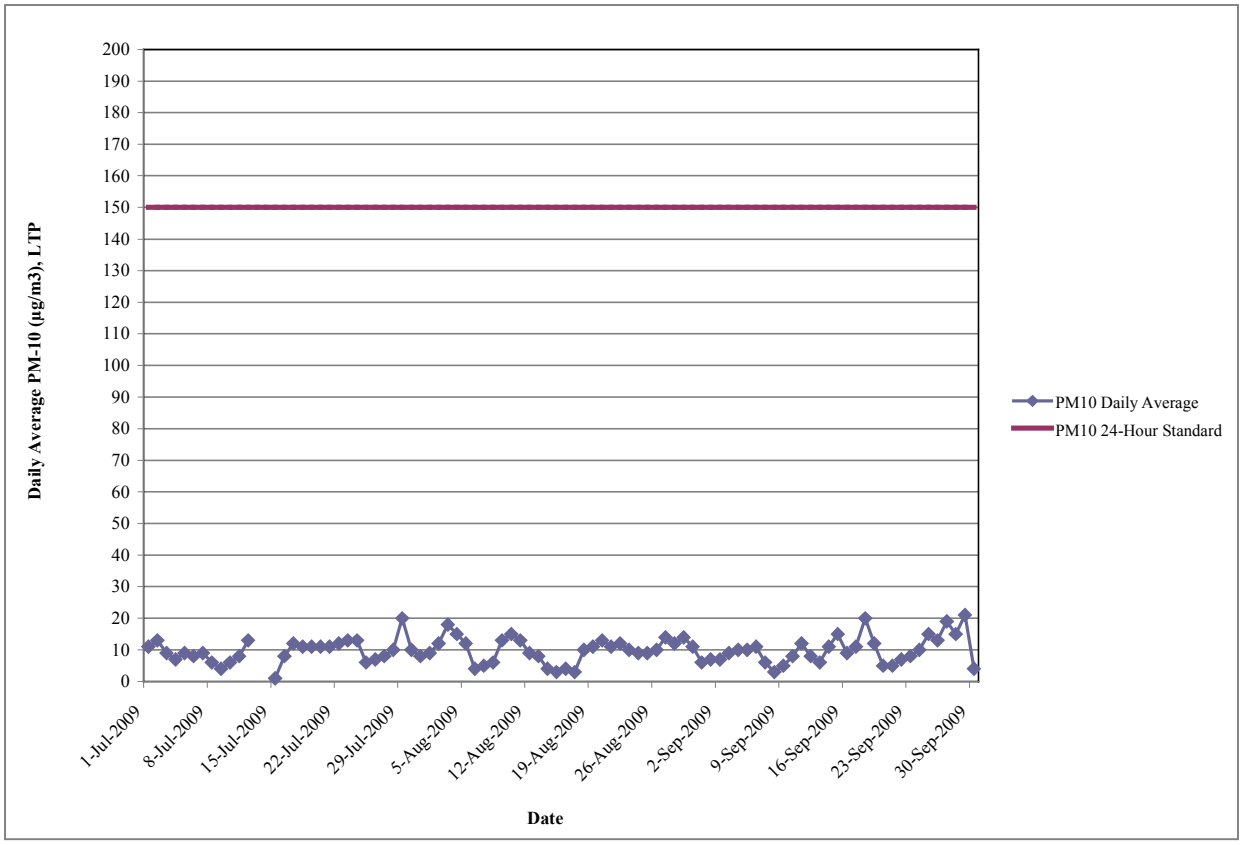

FIGURE 3 - WARM SPRINGS SITE DAILY AVERAGE PM10 CONCENTRATION

3.0 COLLOCATED PARTICULATE MONITORING RESULTS COMPARISON

Daily average (24-hour) results from the ADLC E-BAM TSP monitor at the Opportunity site were compared to the Atlantic Richfield Wedding PM10 monitors at the South Site for the quarter. The ADLC monitor collects screening level data, while the Atlantic Richfield monitors follow a federal reference method (FRM) required for compliance with air quality standards. While these are different measurements, collocated PM10 data collected at Opportunity from May 2007 through June 2008 indicated good general agreement between the E-BAM and Wedding PM10 monitoring systems. Therefore, a comparison of the E-BAM TSP data versus Wedding PM10 data should provide an indication of the ratio of total airborne particulate to the inhalable fraction (PM10).

The individual collocated results are listed in Table 1, and depicted graphically in Figure 4. While the ratio shows high day-to-day variability –particularly at lower concentrations – on average the total amount of airborne particulate (TSP) was approximately 2.5 times the amount of inhalable particulate (PM10). This relationship is consistent whether one calculates the average of the daily TSP/PM10 ratios (2.47), or a total mass ratio (2.49). This is similar to the ratios observed during most previous quarters, which were usually between 2:1 and 3:1. The diagonal line on Figure 4 represents a best-fit linear regression of TSP against daily average PM10 values.

TABLE 1 – COLLOCATED RESULTS FOR TSP VS. PM10
DAILY AVERAGE VALUES
THIRD QUARTER 2009
(All values are $\mu g/m^3$ at Local temperature and pressure (LTP))

Date	Standard ARCO - PM-10 Wedding FRM South Site	Test ADLC - TSP Met One E-BAM Opportunity Site	TSP as Percent of PM-10	TSP as Percent of PM-10 Cumulative
July 3, 2009	10	31	310	310
July 6, 2009	11	32	291	300
July 9, 2009	6	10	167	270
July 12, 2009	9	19	211	256
July 15, 2009	10	20	200	243
July 18, 2009	13	31	238	242
July 21, 2009	15	42	280	250
July 27, 2009	9	15	167	241
July 30, 2009	11	31	282	246
August 2, 2009	12	37	308	253
August 5, 2009	11	31	282	256
August 8, 2009	7	9	129	248
August 11, 2009	12	33	275	251
August 14, 2009	4	7	175	249
August 17, 2009	5	8	160	246
August 20, 2009	14	26	186	240
August 23, 2009	11	30	273	242
August 26, 2009	13	28	215	240
August 29, 2009	15	27	180	236
September 1, 2009	6	12	200	235
September 4, 2009	11	32	291	238
September 7, 2009	6	29	483	244
September 10, 2009	10	39	390	251
September 13, 2009	7	15	214	250
September 16, 2009	10	20	200	248
September 19, 2009	10	36	360	252
September 22, 2009	9	18	200	250
September 25, 2009	18	32	178	246
September 28, 2009	15	46	307	**249**

Mean	247
Maximum	483
Minimum	129

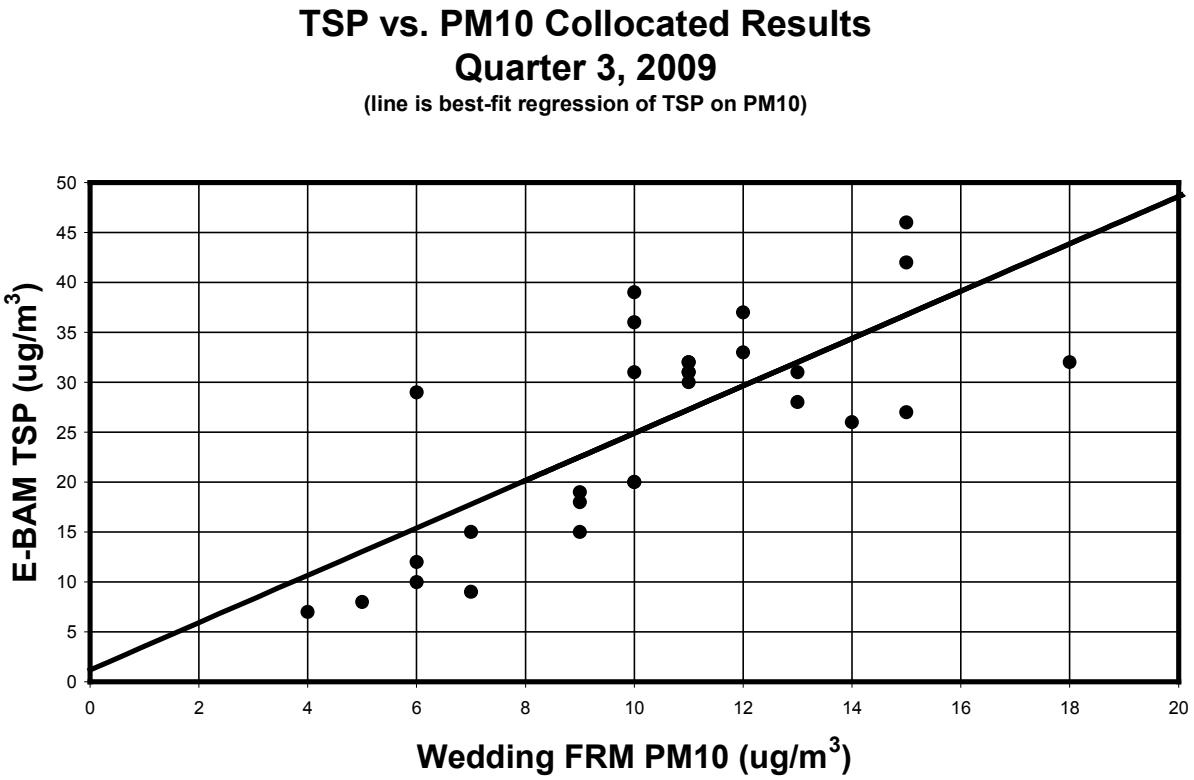

FIGURE 4 – COLLOCATED RESULTS COMPARISON FOR ADLC OPPORTUNITY E-BAM (TSP) AND ATLANTIC RICHFIELD WEDDING FRM (PM10)

4.0 DUST MONITORING RESULTS

Starting August 15, 2008, clean 9-inch diameter glass dishes were set out at both sites at a height of approximately 7 feet to capture and retain settling dust. A personal sampling pump supplied by SKC, Inc. was used to vacuum any settled dust from the dishes during twice-weekly site visits. Vacuuming could not be performed when standing water was present. In those instances, the water was allowed to evaporate, and vacuuming was performed at the next opportunity.

The vacuumed dust was collected onto 37-mm diameter, matched weight mixed cellulose ester (MCE) filter cassettes and submitted for analysis. The samples were analyzed for arsenic, cadmium, copper, lead and zinc, as well as total dust weight.

Settled dust samples were collected at both sites during the third quarter of 2009. Results are summarized in Table 2. A memorandum discussing the collection and analysis of the dust samples is presented in Appendix B, including any data quality concerns. The laboratory analytical report is presented in Attachment 1.

Additional sampling using dustfall jars was implemented in October 2008, but jars emplaced during the third quarter of 2009 were not analyzed due to large amounts of insect and plant material, which made reliable dust mass determinations impossible.

Selected exposed filters from the ARCO South samplers at Opportunity are analyzed for arsenic and lead concentrations, in addition to PM10. Average concentrations of arsenic and lead for the ARCO samples were calculated for the first three quarters of calendar year 2009 on a total mass basis for all days with PM10 concentrations of 10 $\mu g/m^3$ or more, with a result of 108 mg/kg for arsenic and 220 mg/kg for lead. Although the sampling methods are much different, and the ARCO samplers collect only PM10 (rather than total particulate), the arsenic concentrations found in the Opportunity glass dish dust samples were of similar magnitude to that calculated for the ARCO air samples. The lead concentrations found in the Opportunity samples appear to be somewhat lower than the corresponding ARCO result, but are still of the same order of magnitude. Opportunity glass dust dish samples have average settled dust concentrations of 182 mg/kg for arsenic and 134 mg/kg for lead.

TABLE 2 – SUMMARY OF DUST MONITORING RESULTS

Site / Sample Type	Collection Period	As (mg/kg)	Cd (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn (mg/kg)	Net Weight (mg)
Opportunity Settled Dust	07/11/09 to 09/18/09	182	4.88	735	134	619	12.5
Opportunity Settled Dust (Duplicate)	07/11/09 to 09/18/09	182	4.27	684	124	500	8.4
Warm Springs Settled Dust	07/11/09 to 09/18/09	52.4	2.35	228	59.2	282	31.8

5.0 METEOROLOGICAL DATA SUMMARY

Meteorological data were collected continuously and recorded hourly at both the Opportunity and Warm Springs E-BAM monitoring sites. Parameters monitored include wind direction, wind speed, temperature and relative humidity. The data were collected at a height of approximately eight feet above ground level.

Summarized meteorological data for these sites are presented and discussed in Sections 5.1 and 5.2. Detailed daily meteorological summaries are presented in Appendix A. Information presented includes:

- Average, maximum and minimum air (shade) temperature for each day,
- Average and maximum hourly average wind speed for each day,
- Resultant wind direction for each day (weighted by wind speed – this is the mean direction from which the wind was blowing), and
- Average daily relative humidity.

Additionally, the summaries in Appendix A show the average daily and maximum daily PM10 and TSP concentrations, to facilitate correlation with the meteorological data.
Section 5.3 presents wind rose summaries for periods with elevated PM10 and TSP concentrations.

5.1 Opportunity Site

Figure 5 summarizes the meteorological data for the Opportunity site. Winds were generally light, averaging 1.8 m/s (4.0 mph). The highest recorded hourly wind speed was 6.8 m/s (15.2 mph); it is likely that higher short-term gusts have occurred, but the system only monitors hourly average wind speed. Temperatures were near normal in July and August, and above normal in September. Monthly averages were 17.0°C (62.6°F) in July, 16.5°C (61.7°F) in August and 14.6°C (58.3°F) in September. Temperature extremes ranged from a low of –1.7°C (28.9°F) in September to a high of 34.2°C (93.6°F) in August. The average humidity for the quarter was 54%, with considerable daily variation.

Winds at the Opportunity site were mostly from the southwest quadrant, though north-northeasterly winds also were fairly common. The strongest winds tended to be from the north-northeast, and from the west.

Minor meteorological data losses occurred due to routine maintenance and short power outages, but none occurred due to data quality issues. Additionally, 94 hours of wind direction data were lost in July because a set screw worked loose.

Part 1 – Means and Extremes

Parameter	July	August	September	Quarter
Average Wind Speed, m/s	1.7	1.8	2.0	1.8
Maximum (hourly) Wind Speed, m/s	6.8	6.7	6.1	6.8
Average Temperature, °C	17.0	16.5	14.6	16.0
Maximum Temperature, °C	33.9	34.2	29.9	34.2
Minimum Temperature, °C	2.5	2.2	-1.7	-1.7
Average Relative Humidity, %	56	58	48	54
Refer to Appendix A for detailed daily meteorological summaries.				

Part 2 – Quarter 3, 2009 Wind Rose

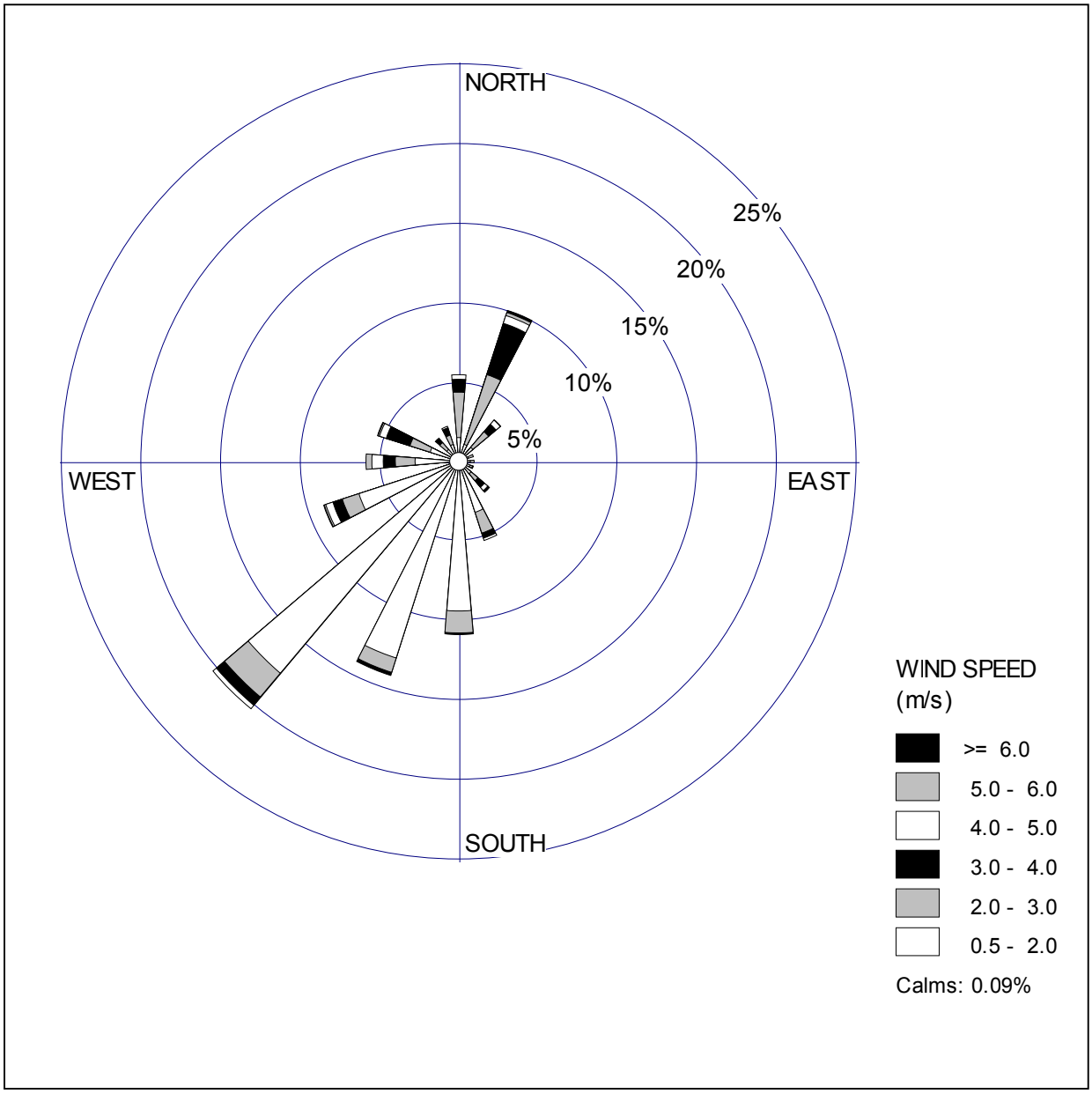

FIGURE 5 – METEOROLOGICAL SUMMARY FOR OPPORTUNITY SITE

5.2 Warm Springs Site

Figure 6 summarizes the meteorological data for the Warm Springs site. Winds were generally light, averaging 1.5 m/s (3.4 mph). The highest recorded hourly wind speed was 7.9 m/s (17.7 mph); it is likely that higher short-term gusts have occurred, but the system only monitors hourly average wind speed. Temperatures were near normal in July and August, and above normal in September. Monthly averages were 17.4°C (63.3°F) in July, 16.6°C (61.9°F) in August and 14.8°C (58.6°F) in September. Temperature extremes ranged from a low of –1.9°C (28.6°F) in September to a high of 33.1°C (91.6°F) in July. The average humidity for the quarter was 55%, with considerable daily variation.

Winds at the Warm Springs site were mostly from southerly directions, though northerly winds also were common. Westerly winds, while occurring less frequently, were often the strongest.

Minor meteorological data losses occurred due to routine maintenance and short power outages, but none occurred due to data quality issues. The E-BAM samplers were out of service for 76 hours in July due to a power supply failure. Additionally, 80 hours of relative humidity data were invalidated in September because of a faulty signal cable connection.

Part 1 – Means and Extremes

Parameter	July	August	September	Quarter
Average Wind Speed, m/s	1.5	1.5	1.6	1.5
Maximum (hourly) Wind Speed, m/s	4.7	7.9	6.0	7.9
Average Temperature, °C	17.4	16.6	14.8	16.3
Maximum Temperature, °C	33.1	32.9	29.7	33.1
Minimum Temperature, °C	3.5	3.7	-1.9	-1.9
Average Relative Humidity, %	56	59	48	55
Refer to Appendix A for detailed daily meteorological summaries.				

Part 2 – Quarter 3, 2009 Wind Rose

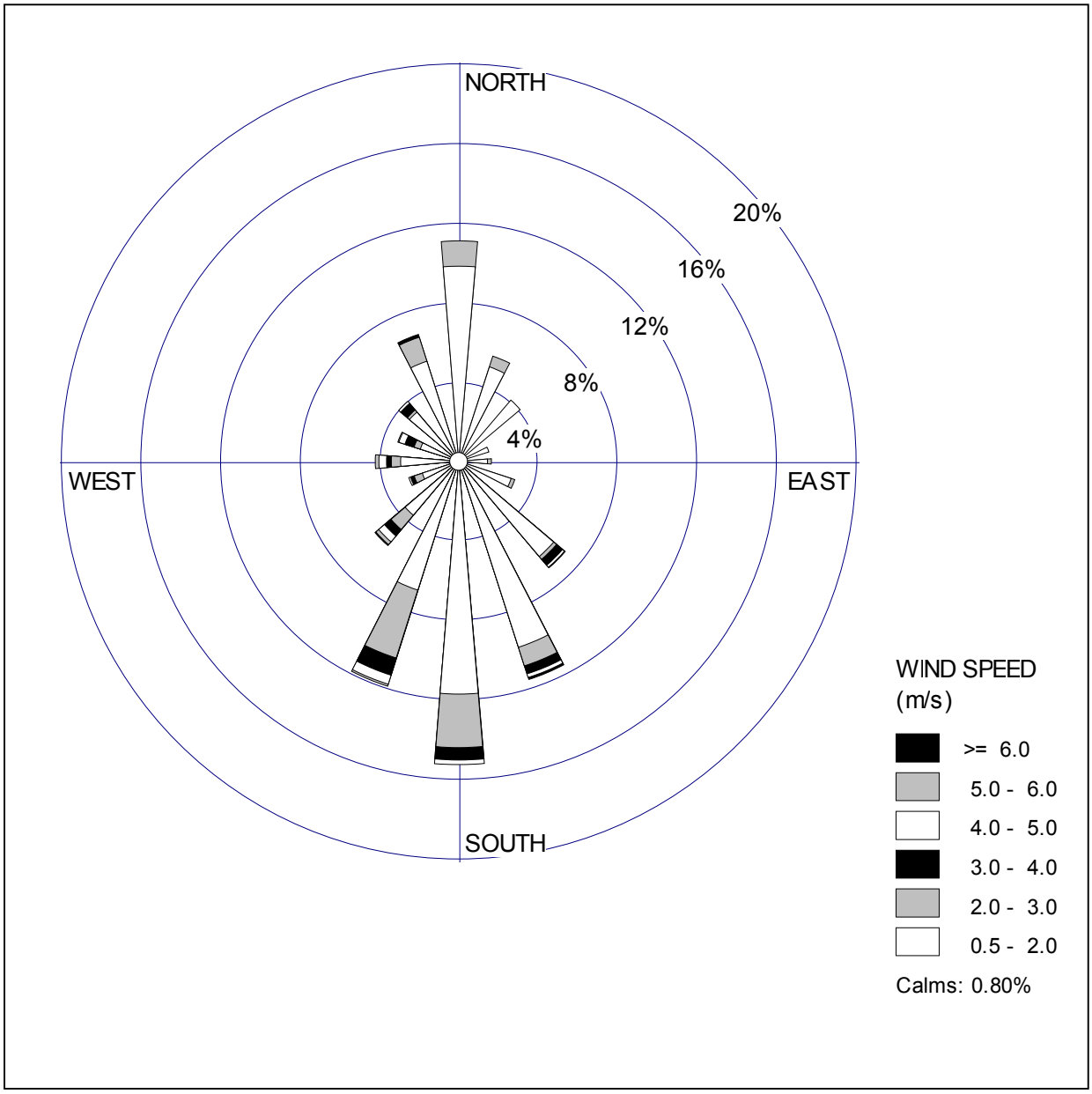

FIGURE 6 – METEOROLOGICAL SUMMARY FOR WARM SPRINGS SITE

5.3 Meteorological Conditions and Particulate Concentrations

Additional wind roses were generated for both monitoring sites to depict wind patterns during periods of elevated particulate concentrations – with the Opportunity site shown in Figure 7 and the Warm Springs site shown in Figure 8. For this analysis, "elevated" was defined as TSP concentrations greater than or equal to 80 $\mu g/m^3$ at Opportunity, and PM10 concentrations of greater than or equal to 25 $\mu g/m^3$ at Warm Springs. These thresholds – corresponding to roughly the 95th percentile at both sites– were used to ensure that a sufficient volume of data was incorporated to produce meaningful wind rose results.

When comparing the wind roses for the Opportunity site (Figures 5 and 7), it is evident that wind speeds were often higher during elevated TSP conditions. This is reasonable, since the larger – and therefore heavier – particulates collected by a TSP monitor would require greater wind activity to be entrained into the air. The wind direction distribution during elevated TSP periods was also notably different from the overall pattern, with north-northeast winds being very pronounced. This indicates potential impacts from the LWMA, though it should be noted that measured TSP concentrations at the Opportunity site were well below the historical TSP standard.

The corresponding wind roses for the Warm Springs site (Figures 6 and 8) show that winds were not significantly different during elevated PM10 periods.

These results suggest that TSP levels at Opportunity are influenced by the Opportunity tailings area during strong northeast winds, but that elevated PM10 levels at Warm Springs are not associated with winds blowing from the tailings area.

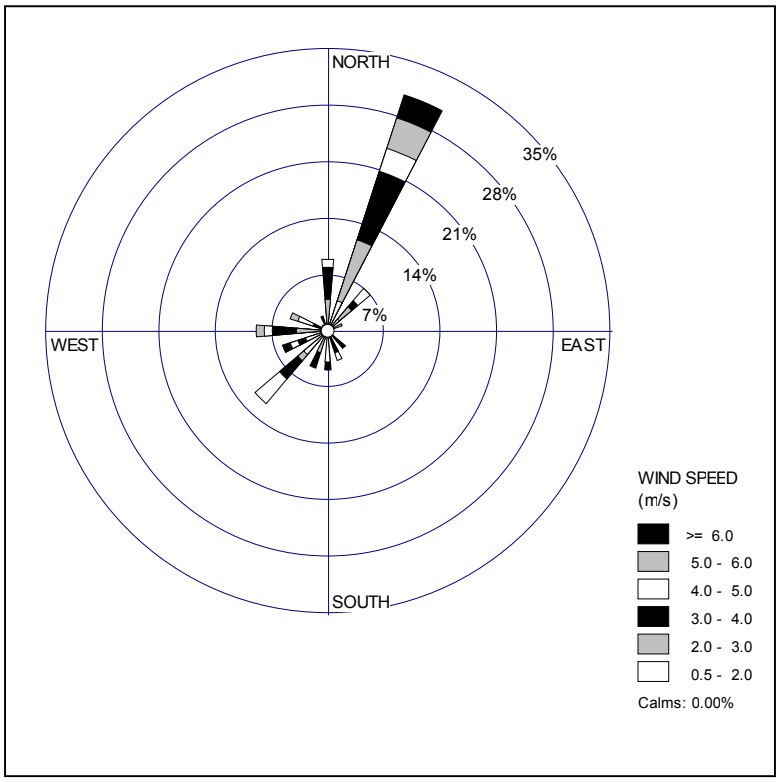

FIGURE 7 – OPPORTUNITY WIND ROSE FOR ELEVATED TSP PERIODS

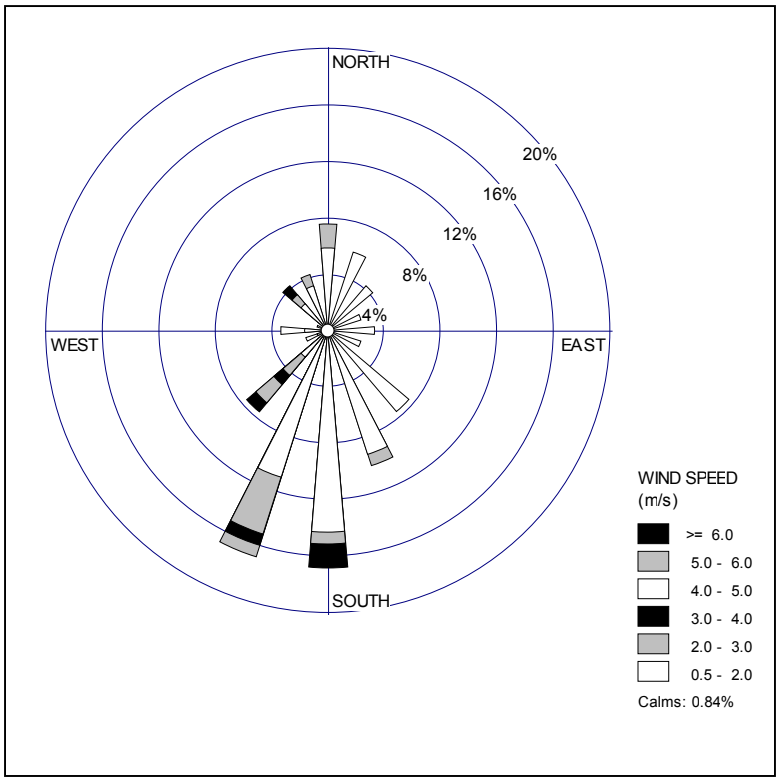

FIGURE 8 – WARM SPRINGS WIND ROSE FOR ELEVATED PM10 PERIODS

6.0 DATA QUALITY SUMMARY

Data quality is an integral part of any ambient monitoring program. The data collected must be of a known quality to be used for evaluation of local air quality and meteorological characteristics. This is particularly important when an objective of a monitoring program is to identify possible emission sources, and meteorological events associated with certain ambient air quality conditions – in this case, elevated PM10 or TSP levels.

The Opportunity and Warm Springs monitoring systems were checked and/or calibrated (as appropriate for each monitoring parameter) monthly during the third quarter of 2009. This was accomplished via performance checks using standards that were either:

- Traceable to NIST; or
- Otherwise certified by the test equipment manufacturer.

Each instrument response was recorded, and evaluated to determine whether it fell within its respective acceptance range. In the event that a response fell outside (or near the limits of) the applicable acceptance range, the monitor or sensor in question was adjusted or recalibrated as appropriate. Such results then must be evaluated, in conjunction with a detailed data review, to identify data periods that must be flagged or invalidated.

Minor sampler maintenance was also performed on a monthly basis. Additionally, data were reviewed frequently via satellite link, and inspected for any suspicious behavior requiring investigation.

6.1 Summary of Performance Check / Maintenance Activities

Performance checks and minor maintenance were conducted on a monthly basis. Table 3 summarizes checks and maintenance for the E-BAM sampler itself, while Table 4 lists the meteorological checks. Information presented includes:

- The instrument model and serial number for each component of the monitoring system;
- Each type of check/maintenance performed on that component;
- Performance acceptance ranges; and
- A description of the calibration standard (and its traceability) used to perform each check.

6.2 Data Quality Issues

In general, performance checks and maintenance activities conducted throughout the third quarter of 2009 indicted that the E-BAM samplers were meeting performance objectives. The performance check procedures and routine maintenance activities are discussed in detail in Appendix C. Results for the third quarter of 2009 are presented in Appendix D. All E-BAM sampler test results obtained during the third quarter of 2009 were satisfactory.

Causes of data losses during the third quarter included the following:

- A total of 94 hours of wind direction data at Opportunity were lost because a set screw worked loose on the vane assembly.
- All data for the Warm Springs site were lost for a 76-hour period in July because the E-BAM sampler's power supply failed.
- A total of 80 hours of relative humidity data at Warm Springs were invalidated because of a faulty cable connection
- Additional minor data losses occurred at both sites due to routine maintenance and short power outages.

TABLE 3 – SUMMARY OF PERFORMANCE CHECKS E-BAM SAMPLER

Met One E-BAM PM_{10} and TSP Samplers

Instrument	Model	Serial No.		Check Description			
		OPP	*WS*	*Check Description*	*Acceptance Range*	*Check/Cal. Standard*	*Traceability*
Particulate Sampler	E-BAM	F7290 (TSP)	F7289 (PM_{10})	Leak Check	<1.5 LPM	BX-302 valve	N/A
				Operating Flow	+/- 2% (+/- 0.33 LPM)	Delta Cal S/N 000498	MFR/NIST
				Pump Test	(1)	BX-302 valve	N/A
				Zero/Span	Pass / Fail	Membrane Plates	MFR
				Clean Vane & Nozzle	(2)	N/A	N/A
				Clean PM10 Head	N/A	N/A	N/A
Barometer (3)	E-BAM	F7290	F7289	Collocated	+/- 2 mmHg	Aneroid Barometer	Mercury Barometer

Explanatory Notes for Table 3

N/A = Not applicable
MFR/NIST = Certified traceable to NIST by the manufacturer
MFR = Certified accurate per Met One's E-BAM-6100 Final Test Procedure
(1) Acceptance range varies with test flow rate, see Appendix C for discussion.
(2) Leak check performed following cleaning, result must be <1.5 LPM.
(3) Barometer is internal to E-BAM sampler.

TABLE 4 – SUMMARY OF PERFORMANCE CHECKS METEOROLOGICAL INSTRUMENTS

Met One Meteorological Instruments

Instrument (1)	Model	Serial No.		Check Description			
		OPP	*WS*	*Check Description*	*Acceptance Range*	*Check/Cal. Standard*	*Traceability*
Temperature	9250	F9487	F9481	Collocated	+/- 0.5 °C	Assmann Psychrometer	NIST
Relative Humidity	593	F9346	F9349	Collocated	+/- 5% Relative Humidity	Assmann Psychrometer	NIST
Wind Speed	0348	G2181	G2187	Collocated	+/- 0.5 m/s	Met One 010 Sensor	NIST
				Rotation Check	+/- 0.2 m/s	Synchronous Motor	MFR
Wind Direction	0348	G2181	G2187	Initial Alignment	+/- 2 degrees	Solar Sighting	NIST Time
				Linearity	+/- 3 degrees	Visual Crossarm Alignment (2)	N/A

Explanatory Notes for Table 4

(1) All meteorological instruments include certificate of NIST traceability from Met One, valid for a period of one year.
(2) Linearity checked by visually aligning wind vane in 90-degree increments with respect to crossarm.

MFR = Motor rotation rate provided by manufacturer.

7.0 AIR QUALITY SYSTEM NULL DATA QUALIFIER CODES

Invalid hours for the quarter are summarized in Table 5 for the Opportunity site, and Table 6 for the Warm Springs site. The complete PM10 and TSP data sets for the quarter, and current qualifier codes are presented in Appendix E.

TABLE 5 – OPPORTUNITY SITE INVALID DATA PERIODS QUARTER 3, 2009

Part A – TSP

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
7-3-2009	1200	1900	Power outage	AV
7-10-2009	1400-1500	2100-2200	Monthly checks	BA
8-5-2009	1800, 2000		Power outage	AV
8-6-2009	1500	0100, 0300, 2200	Power outage	AV
8-7-2009	0000-0200	0700-0900	Power outage	AV
8-20-2009	1400	2100	Monthly checks	BA
8-24-2009	1300-1400	2000-2100	Repaired leak	BA
9-15-2009	1500	2200	Monthly checks	BA

Part B – Wind Direction / Wind Speed

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
7-3-2009	1200	1900	Power outage	AV
7-24-2009	1400	2100	Monthly checks	BA
7-24-2009	1500-2300	2200-2300	Set screw loosened	AM (1)
7-25-2009	0000-2300	0000-2300	Set screw loosened	AM (1)
7-26-2009	0000-2300	0000-2300	Set screw loosened	AM (1)
7-27-2009	0000-2300	0000-2300	Set screw loosened	AM (1)
7-28-2009	0000-1200	0000-1900	Set screw loosened	AM (1)
8-20-2009	1300	2000	Monthly checks	BA
9-18-2009	1200	1900	Monthly checks	BA
(1) Only wind direction was invalid for these periods.				

Part C – Temperature / Relative Humidity

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
7-3-2009	1200	1900	Power outage	AV

TABLE 6 – WARM SPRINGS SITE INVALID DATA PERIODS QUARTER 3, 2009

Part A – PM10

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
7-10-2009	1100-1300	1800-2000	Monthly checks	BA
7-12-2009	1200-2300	1900-2300	Power supply failure	AV
7-13-2009	0000-2300	0000-2300	Power supply failure	AV
7-14-2009	0000-2300	0000-2300	Power supply failure	AV
7-15-2009	0000-1500	0000-2200	Power supply failure	AV
8-20-2009	1200	1900	Monthly checks	BA
9-15-2009	1300	2000	Monthly checks	BA
9-25-2009	1300-1500	2000-2200	Power outage	AV

Part B – Wind Direction / Wind Speed

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
7-12-2009	1200-2300	1900-2300	Power supply failure	AV
7-13-2009	0000-2300	0000-2300	Power supply failure	AV
7-14-2009	0000-2300	0000-2300	Power supply failure	AV
7-15-2009	0000-1500	0000-2200	Power supply failure	AV
7-24-2009	1500	2200	Monthly checks	BA
8-20-2009	1100	1800	Monthly checks	BA
9-18-2009	1200	1900	Monthly checks	BA
9-25-2009	1300-1400	2000-2100	Power outage	AV

Part C – Temperature / Relative Humidity

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
7-12-2009	1200-2300	1900-2300	Power supply failure	AV
7-13-2009	0000-2300	0000-2300	Power supply failure	AV
7-14-2009	0000-2300	0000-2300	Power supply failure	AV
7-15-2009	0000-1500	0000-2200	Power supply failure	AV
8-27-2009	1100	1800	Spurious reading	AM (1)
9-4-2009	0900-2300	1600-2300	Loose connection	AN (1)
9-5-2009	0000-2300	0000-2300	Loose connection	AN (1)
9-6-2009	0000-2300	0000-2300	Loose connection	AN (1)
9-7-2009	0000-1600	0000-2300	Loose connection	AN (1)
9-25-2009	1300-1400	2000-2100	Power outage	AV
(1) Relative humidity data only				

8.0 REFERENCES

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APPENDIX A

MONTHLY DATA SUMMARIES
THIRD QUARTER 2009

OPPORTUNITY DAILY DATA SUMMARY - JULY 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	33	92	1.7	3.3	358	17.3	26.1	8.3	47
2	38	100	1.4	3.2	326	16.7	25.7	5.7	62
3	31	108	1.3	2.5	171	17.6	25.9	10.6	59
4	29	81	1.8	3.4	181	18.3	26.4	7.7	51
5	23	53	1.9	4.1	198	18.4	27.4	11.5	54
6	32	213	2.1	4.8	139	17.0	26.2	8.3	63
7	20	61	2.0	4.7	295	13.4	21.5	4.3	63
8	6	15	1.6	3.1	224	9.9	14.3	4.1	74
9	10	29	1.8	3.7	304	11.2	17.7	2.5	63
10	13	41	1.5	3.3	167	14.9	24.6	4.3	53
11	17	46	1.4	2.8	287	18.2	28.7	5.7	49
12	19	76	1.8	4.1	195	17.6	24.9	10.1	62
13	12	100	2.9	6.8	276	14.2	18.0	11.4	66
14	11	43	1.7	3.1	299	13.7	20.3	9.7	70
15	20	66	1.8	3.4	252	17.5	26.4	7.8	51
16	22	43	1.9	3.4	39	18.8	28.6	7.5	44
17	23	57	1.5	2.6	355	19.0	28.0	9.0	48
18	31	110	1.5	3.3	247	20.9	32.4	8.9	43
19	33	82	2.2	4.3	296	20.7	29.4	12.1	39
20	116	610	1.6	2.8	11	16.5	25.9	4.6	44
21	42	126	1.5	3.3	345	18.2	28.9	5.4	45
22	30	102	1.6	3.5	212	20.9	32.0	9.4	37
23	65	464	1.9	3.7	186	23.7	33.9	11.1	34
24	46	257	1.9	5.6	356	20.3	30.3	10.9	55
25	22	68	1.7	3.2	NO DATA	19.4	30.7	9.9	58
26	24	131	2.2	5.2	NO DATA	18.7	27.7	9.2	60
27	15	88	1.6	4.2	NO DATA	14.9	20.1	10.0	80
28	18	66	1.3	4.0	334	13.2	21.9	6.8	78
29	20	92	1.6	2.7	9	13.9	20.6	6.0	65
30	31	94	1.6	3.3	13	14.9	24.5	3.9	56
31	17	70	1.7	3.0	3	15.6	22.9	9.1	62

(a) Values are at Local temperature and pressure (LTP).
(b) Calculations are weighted with corresponding wind speeds

OPPORTUNITY DAILY DATA SUMMARY - AUGUST 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	32	167	1.8	3.0	247	20.6	30.3	11.0	48
2	37	79	2.3	4.3	253	21.2	29.6	12.9	36
3	54	206	1.6	2.7	254	20.4	29.7	9.5	45
4	32	78	2.0	3.9	261	22.6	30.5	15.0	38
5	31	81	1.8	3.8	259	16.7	23.4	10.6	69
6	10	49	1.8	4.1	307	15.6	23.4	11.4	75
7	7	26	1.9	5.1	272	12.2	17.6	7.5	76
8	9	30	1.4	2.8	4	11.9	18.4	6.8	74
9	23	114	1.6	3.1	22	13.4	21.4	6.6	70
10	19	35	1.7	3.3	224	17.1	25.4	8.4	57
11	33	233	2.0	4.4	215	19.7	29.2	10.3	46
12	31	141	2.2	5.3	13	17.7	27.0	7.3	54
13	32	181	2.3	6.2	13	13.1	20.5	8.0	69
14	7	51	1.7	3.8	326	10.3	17.7	6.9	79
15	6	37	2.2	4.5	304	8.7	14.1	2.6	68
16	6	25	1.4	3.6	124	9.1	14.4	3.7	73
17	8	29	1.4	2.8	22	12.0	20.9	2.2	65
18	17	41	2.6	4.6	259	16.6	23.4	8.1	54
19	26	53	2.0	3.4	324	18.9	26.4	10.6	51
20	26	64	1.6	3.2	177	18.8	31.2	6.4	56
21	26	61	1.7	3.1	254	21.9	34.2	10.4	48
22	23	48	2.0	4.3	355	18.6	27.4	10.1	53
23	30	149	2.1	6.7	163	14.9	22.7	8.9	70
24	17	54	1.2	2.0	157	15.6	25.8	6.6	61
25	20	41	1.6	3.1	225	17.8	27.6	7.7	48
26	28	55	2.1	3.6	222	20.0	30.0	9.2	44
27	26	54	1.7	3.6	344	18.0	29.0	6.8	46
28	29	75	1.4	2.5	217	17.3	30.9	5.5	49
29	27	58	1.7	4.0	62	17.9	26.1	9.7	51
30	35	242	2.4	6.1	278	18.2	27.5	11.1	55
31	9	35	1.6	4.0	204	15.6	22.0	10.8	68

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

OPPORTUNITY DAILY DATA SUMMARY - SEPTEMBER 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	12	22	1.3	1.8	169	19.3	28.2	12.6	55
2	18	44	1.3	2.2	206	18.7	29.9	9.5	52
3	31	79	2.3	4.7	223	21.3	28.6	14.2	38
4	32	110	1.6	3.7	15	17.2	28.5	7.4	50
5	27	68	1.9	5.1	212	17.3	29.0	7.5	56
6	44	303	2.6	6.1	14	15.7	25.0	9.2	61
7	29	139	2.4	4.7	13	9.6	16.7	1.8	61
8	12	38	1.4	2.2	233	9.0	20.1	-1.2	51
9	22	58	1.9	4.4	235	12.8	25.4	0.8	41
10	39	158	1.8	4.2	351	13.3	22.4	5.2	48
11	30	59	1.2	2.1	278	12.3	23.9	1.6	54
12	34	236	1.4	3.1	204	13.4	26.4	1.0	46
13	15	37	1.6	2.8	341	12.7	22.8	1.1	48
14	42	164	2.1	3.7	14	17.1	26.6	7.0	44
15	27	58	1.3	2.7	311	17.4	27.8	7.7	53
16	20	66	1.8	4.1	180	18.9	29.4	8.2	51
17	34	205	2.3	4.7	223	19.9	29.4	12.0	44
18	41	136	1.1	2.1	218	17.3	29.9	6.5	57
19	36	95	2.8	4.8	228	19.9	29.4	11.0	41
20	26	67	3.4	5.6	281	10.9	15.0	5.6	49
21	17	50	1.7	3.5	117	8.1	17.1	-0.4	53
22	18	49	1.3	2.5	175	11.3	23.4	1.3	52
23	27	74	1.4	2.3	186	15.2	28.9	4.8	49
24	32	89	1.8	4.0	101	17.1	29.0	7.5	37
25	32	65	1.7	3.6	355	14.7	26.4	4.8	44
26	73	222	2.8	5.3	248	16.5	26.2	5.8	33
27	67	335	2.1	4.3	340	10.7	18.5	0.6	40
28	46	156	2.3	4.8	175	13.8	26.9	-1.7	33
29	73	279	2.6	4.8	232	14.2	22.6	3.7	39
30	10	32	3.5	5.8	290	2.8	5.8	1.4	71

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - JULY 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	11	33	1.2	2.3	348	16.9	25.8	6.5	52
2	13	36	1.2	2.6	333	16.9	25.8	7.7	63
3	9	35	1.5	2.8	155	18.2	25.8	10.8	59
4	7	24	2.0	4.0	179	18.8	25.7	8.7	49
5	9	27	2.0	3.5	186	18.6	27.0	12.5	55
6	8	24	1.6	2.6	159	17.1	25.9	8.4	63
7	9	19	1.7	4.0	211	14.1	21.8	6.2	63
8	6	28	1.7	3.8	221	10.7	15.2	5.1	73
9	4	22	1.6	4.2	256	12.0	18.6	3.5	62
10	6	18	1.4	2.2	168	14.9	24.6	5.0	54
11	8	30	1.3	2.3	291	18.5	28.3	7.9	49
12	13	42	1.2	1.8	209	16.6	25.6	11.5	60
13	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
14	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
15	1	11	2.0	3.8	306	19.6	26.4	10.5	40
16	8	36	1.5	2.4	67	19.1	28.8	9.0	45
17	12	44	1.3	2.0	352	19.3	28.2	10.9	49
18	11	34	1.6	3.8	257	21.0	31.4	11.3	46
19	11	45	2.0	4.7	306	20.3	29.0	10.6	42
20	11	54	1.1	1.8	11	16.5	26.1	4.5	49
21	11	38	1.3	1.8	121	18.7	28.7	8.4	46
22	12	42	1.4	2.0	284	20.8	31.3	10.3	40
23	13	44	1.9	3.9	173	23.3	33.1	11.6	35
24	13	33	1.5	2.7	55	20.2	29.3	11.7	56
25	6	26	1.5	3.4	204	19.2	29.2	12.0	60
26	7	25	1.5	3.5	352	18.0	26.7	10.5	66
27	8	26	1.1	2.0	348	15.4	21.1	10.7	80
28	10	35	1.4	3.5	231	13.9	21.8	8.7	79
29	20	136	1.2	2.1	353	14.2	21.3	5.3	65
30	10	26	1.2	2.0	93	15.7	25.1	6.2	56
31	8	24	1.3	2.2	352	16.2	23.5	10.1	62

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - AUGUST 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	9	20	1.5	2.5	181	20.4	30.0	11.6	51
2	12	29	2.4	4.9	239	20.5	28.9	11.2	41
3	18	34	1.3	2.1	182	20.5	29.2	10.0	46
4	15	105	1.9	4.3	245	22.0	30.0	14.7	42
5	12	26	1.7	3.8	248	16.5	23.6	11.1	71
6	4	21	1.3	2.2	285	15.3	21.8	12.1	78
7	5	19	1.6	4.9	241	13.1	18.0	8.1	76
8	6	23	0.9	1.9	9	12.6	19.1	7.1	73
9	13	25	1.1	2.4	254	13.3	21.6	5.1	72
10	15	56	2.1	3.4	209	17.3	26.3	9.2	57
11	13	31	2.6	5.1	206	19.9	29.1	10.5	46
12	9	27	1.3	2.1	10	17.5	26.7	8.7	56
13	8	29	1.3	2.5	23	13.7	21.2	7.6	70
14	4	22	1.1	3.7	336	10.3	17.3	4.5	82
15	3	20	1.3	2.2	51	9.2	14.5	3.7	71
16	4	29	1.2	2.4	182	9.3	14.3	4.5	76
17	3	17	1.2	1.7	138	12.5	21.1	3.7	67
18	10	22	2.0	3.8	257	16.7	23.3	8.8	57
19	11	22	1.2	1.7	63	19.0	26.8	11.1	53
20	13	50	1.2	1.8	166	19.0	30.5	8.9	57
21	11	27	1.4	2.5	253	21.1	32.9	12.5	52
22	12	31	1.3	2.4	359	18.7	27.6	10.3	55
23	10	25	2.2	7.9	161	15.2	22.3	9.2	71
24	9	33	1.2	2.0	156	15.3	25.0	6.4	61
25	9	27	1.5	3.4	183	17.4	27.6	7.0	53
26	10	24	2.0	4.5	205	20.0	30.9	10.4	44
27	14	35	1.5	2.4	175	18.4	28.9	8.6	48
28	12	24	1.1	1.8	141	17.9	29.9	8.0	47
29	14	27	1.2	1.8	6	18.6	26.4	11.2	49
30	11	27	1.7	4.2	254	18.3	27.6	10.0	54
31	6	14	1.4	3.6	183	15.8	22.6	10.3	69

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - SEPTEMBER 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minimum Temperature (deg C)	Average Relative Humidity (percent)
1	7	28	1.4	2.2	152	19.4	28.3	11.1	56
2	7	21	1.7	3.0	172	19.4	29.3	10.4	52
3	9	26	2.4	4.9	205	21.1	29.3	12.2	38
4	10	23	1.1	1.8	8	16.6	28.3	7.6	79
5	10	27	1.7	4.1	186	17.4	28.2	7.6	NO DATA
6	11	23	1.8	3.3	118	16.0	25.3	9.9	NO DATA
7	6	31	1.2	2.3	12	9.9	17.8	2.4	55
8	3	23	1.5	2.9	193	9.5	20.6	-1.0	52
9	5	17	1.8	4.0	193	13.6	25.4	2.2	39
10	8	24	1.1	1.9	23	13.0	23.2	3.1	51
11	12	31	1.1	1.9	199	12.9	24.0	2.6	53
12	8	19	1.4	2.3	206	14.2	26.2	3.7	45
13	6	20	1.3	2.0	48	13.2	23.7	3.4	48
14	11	26	1.1	1.8	40	16.1	26.7	5.6	49
15	15	48	1.0	1.8	336	17.2	27.7	8.1	56
16	9	31	1.8	3.6	171	19.1	28.8	9.2	50
17	11	35	2.1	3.8	199	19.8	28.3	12.2	44
18	20	165	1.0	1.5	136	17.2	29.1	6.6	58
19	12	39	2.4	4.9	203	19.9	29.7	9.5	41
20	5	20	2.5	5.6	299	10.7	14.4	3.7	54
21	5	16	1.3	2.6	159	8.0	18.1	-1.9	55
22	7	21	1.1	1.7	151	11.7	23.8	0.9	52
23	8	24	1.3	1.7	161	15.8	28.8	5.2	47
24	10	26	1.5	2.5	167	17.0	29.2	4.2	38
25	15	41	1.0	1.7	81	13.8	26.8	3.1	47
26	13	23	2.7	5.7	232	16.7	26.7	8.1	34
27	19	34	1.4	1.9	338	10.7	19.8	2.4	42
28	15	54	2.5	4.8	168	14.5	26.8	-0.7	33
29	21	53	2.8	6.0	213	15.1	23.9	3.8	38
30	4	15	1.5	2.8	246	3.4	7.5	1.1	73

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

APPENDIX B

DUST SAMPLE MEMORANDA

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MEMORANDUM – Opportunity / Warm Springs Settled Dust Sampling Events
Sampling Period: July 11 – September 18, 2009

Submitted by Steve Heck, Blacktail Consulting, Inc.

December 9, 2009

This memorandum describes the preliminary results of settled dust sampling conducted at the Opportunity and Warm Springs air monitoring sites on behalf of Kuipers and Associates, and Anaconda-Deer Lodge County. All data, discussion and conclusions provided in this report are preliminary and will undergo a complete quality assurance review prior to issuance of final results in quarterly and annual reports in accordance with the project Sampling and Analysis Plan.

1. SAMPLE COLLECTION

On July 11, 2009, four clean 9-inch diameter glass dishes were set out at both sites at a height of approximately 7 feet to capture and retain settling dust. A personal sampling pump supplied by SKC, Inc. was used to vacuum any settled dust from the dishes during twice-weekly site visits. Vacuuming could not be performed when standing water was present. In those instances, the water was either dumped or allowed to evaporate, and vacuuming was performed at the next opportunity.

The vacuumed dust was collected onto 37-mm diameter, matched weight mixed cellulose ester (MCE) filter cassettes. The filters were recommended by the manufacturer for applications involving trace element analyses. The matched filter weights allow one to avoid filter pre-weighing. The total dust determination is made by simply weighing the two filters following sampling; the difference in their weights equals the mass of dust collected.

The glass dishes were vacuumed for the last time on September 18, 2009, and the cassettes were submitted to the MSE Laboratory for analysis. Both samples were weighed to determine the total amount of particulate collected. Samples having a sufficient net dust mass (≥ 1.0 mg) were analyzed for arsenic, cadmium, copper, lead and zinc.

Previously, the dust from all four dishes at each site had been vacuumed onto a single filter cassette to ensure that a sufficient amount of dust was collected to obtain reliable analytical results. However, because airborne particulate levels are highest during the late summer, the decision was made to obtain duplicate samples at the Opportunity site for this event. This was accomplished by vacuuming dust separately onto two filter cassettes; each cassette included the dust collected from two dishes.

2. ANALYTICAL PROCEDURES

Following weighing, exposed filters were digested using Method SW-846 3050B for soils, and analyzed for trace metals by ICP Mass Spectrometer (ICP-MS) using Method SW-846 6020A. Additionally, a blank filter cassette was analyzed to provide background concentrations for the MCE filters.

3. ANALYTICAL RESULTS

Table 1 presents settled dust trace element results for the Opportunity site. Table 2 presents results for the Warm Springs site.

3.1 Filter Weights

The filters were weighed on an enclosed balance with a resolution of 0.0001 grams (0.1 mg). Results are shown in Section A of Tables 1 and 2. The "Tare" filter weight is the weight of the unexposed matched weight filter, and the "Exposed" weight is the weight of the filter dust was collected on. The net dust weight is calculated as the difference between these values.

For the Opportunity site, the mass of dust collected was 12.5 mg for the reference sample, and 8.4 mg for the duplicate sample. The dust mass for the Warm Springs sample was 31.8 mg. These masses were all sufficient for trace element analyses.

3.2 Trace Element Results

The trace element results are presented in Section B of Tables 1 and 2. The "Total" results represent the trace element concentrations in the exposed filter – which includes contributions from both the filter material and the collected dust. A blank filter was analyzed for trace elements, with results shown in the column labeled "Blank." Next, net filter trace element concentrations were calculated by subtracting the blank values from the total values. The net results represent the average trace element concentrations throughout the filter based solely on the contribution from the collected dust.

3.3. Trace Element Concentrations in Dust

The net trace element concentrations in Section B are for the entire exposed filter mass. Trace element concentrations in the collected dust were calculated using the net trace element results, the exposed filter weight and the collected dust weight. For the reference sample at Opportunity, the net dust weight was 0.0125 grams, while the total weight of the exposed MCE filter was

0.0612 grams. The following example illustrates the calculation used to determine trace element concentrations in the collected dust:

- Concentration of arsenic over the entire exposed filter was 37.3 mg/kg. Therefore, the amount of arsenic present was 37.3 mg/kg x 0.0612 g, or 2.283×10^{-3} mg.
- Because all of this net arsenic concentration was contained in the dust portion, the arsenic concentration in dust was 2.283×10^{-3} mg / 0.0125 g, or 182 mg/kg.

The concentrations of other trace elements in the dust were calculated using the same approach. Results are summarized in Section C of Tables 1 and 2.

Disassembly and weighing of the filter cassettes proceeded smoothly for these samples, and no analytical issues were encountered.

3.4 Duplicate Sample Results

Part C of Table 1 shows the calculated relative percent difference (RPD) for the two dust samples collected at Opportunity. All were below 20%, with the exception of zinc, which had an RPD of 21.4%. The higher RPD for zinc is not unexpected, because of the relatively high background concentration of zinc found in the blank filter. Additionally, the filters' zinc background concentrations have shown considerable variability.

The duplicate results also provide some confirmation of the analytical laboratory's consistency with respect to sample preparation and analysis. Unfortunately, there is no reliable way to split an exposed cassette filter sample for preparation of a laboratory duplicate.

4. CONCLUSIONS AND RECOMMENDATIONS

The laboratory analysis proceeded smoothly for these filters. The dust masses collected were sufficient for reliable trace element determinations, and the duplicate sample results were generally good. All calculated analyte concentrations were at least five times greater than the mass-adjusted laboratory reporting limit.

Settled dust sampling will continue as described herein, as the glass dish methodology has yielded the most consistent and reliable data on trace element concentrations in airborne particulate.

TABLE 1 - OPPORTUNITY SETTLED DUST SAMPLE RESULTS
(Sampling conducted 7-11-2009 through 9-18-2009)

A. Filter Weight Data

Opportunity Analyzed Filter Weight (g)	0.0610
Opportunity Tare Filter Weight (g)	0.0485
Opportunity Net Particulate Weight (g)	0.0125
Opportunity Duplicate Analyzed Filter Weight (g)	0.0603
Opportunity Duplicate Tare Filter Weight (g)	0.0519
Opportunity Duplicate Net Particulate Weight (g)	0.0084

B. Trace Element Results

	Opportunity			*Opportunity - Duplicate*			*Blank* (1)
Analyte	Total Filter Conc. (mg/kg)	Net Filter Conc. (mg/kg)	Reporting Limit (mg/kg)	Total Filter Conc. (mg/kg)	Net Filter Conc. (mg/kg)	Reporting Limit (mg/kg)	Conc. (mg/kg)
As	37.3	37.3	1.21	25.3	25.3	1.49	ND
Cd	1.00	1.00	0.081	0.595	0.595	0.100	ND
Cu	151	151	1.01	95.8	95.3	1.25	0.456
Pb	27.7	27.5	0.162	17.5	17.3	0.199	0.158
Zn	149	127	2.43	91.7	69.6	2.99	22.1

(1) Blank concentration based on unexposed filter

C. Calculated Trace Element Concentrations in Particulate

	Opportunity			*Opportunity - Duplicate*			
Analyte	Net Filter Conc. (mg/kg)	***Net Particulate Conc. (mg/kg)***	(1) Reporting Limit (mg/kg)	Net Filter Conc. (mg/kg)	***Net Particulate Conc. (mg/kg)***	(1) Reporting Limit (mg/kg)	**RPD %**
As	37.3	***182***	5.90	25.3	***182***	10.7	**0.2**
Cd	1.00	***4.88***	0.395	0.595	***4.27***	0.718	**13.3**
Cu	151	***735***	4.93	95.3	***684***	8.97	**7.1**
Pb	27.5	***134***	0.791	17.3	***124***	1.43	**7.7**
Zn	127	***619***	11.9	69.6	***500***	21.5	**21.4**

(1) Reporting Limit adjusted to reflect mass of particulate collected

TABLE 2 - WARM SPRINGS SETTLED DUST SAMPLE RESULTS
(Sampling conducted 7-11-2009 through 9-18-2009)

A. Filter Weight Data

Warm Springs Exposed Filter Weight (g)	0.0817
Warm Springs Tare Filter Weight (g)	0.0499
Warm Springs Net Particulate Weight (g)	0.0318

B. Trace Element Results

	Warm Springs			***Blank*** (1)
Analyte	Total Filter Conc. (mg/kg)	Net Filter Conc. (mg/kg)	Reporting Limit (mg/kg)	Average Conc. (mg/kg)
As	20.4	20.4	1.51	ND
Cd	0.914	0.914	0.100	ND
Cu	89.1	88.6	1.26	0.456
Pb	23.2	23.0	0.201	0.158
Zn	132	110	3.01	22.1

(1) Blank concentration based on unexposed filter

C. Calculated Trace Element Concentrations in Particulate

	Warm Springs		
Analyte	Net Filter Conc. (mg/kg)	***Net Particulate Conc. (mg/kg)***	(1) Reporting Limit (mg/kg)
As	20.4	***52.4***	3.88
Cd	0.914	***2.35***	0.257
Cu	88.6	***228***	3.24
Pb	23.0	***59.2***	0.516
Zn	110	***282***	7.73

(1) Reporting Limit adjusted to reflect mass of particulate collected

APPENDIX C

E-BAM PERFORMANCE CHECK / MAINTENANCE PROCEDURES
THIRD QUARTER 2009

1.1 Performance Check / Maintenance Procedures

1.1.1 E-BAM Sampler

Several checks are performed on the E-BAM sampler, including both its particulate monitoring system and the internal barometric pressure sensor.

1.1.1.1 Leak Check (E-BAM Manual Section 2.4.1.1)

Each month, the E-BAM sampler is checked for leaks in the sampling train that could compromise data integrity. This check is performed by installing a BX-302 valve/filter assembly in place of the sampling inlet, and running the sampler in its "pump test" mode while slowly closing the valve. The check is considered satisfactory if the flow drops to below 1.5 LPM.

1.1.1.2 Operating Flow Rate Check (E-BAM Manual Section 2.4.1.5)

The operating flow rate check is performed monthly by installing an NIST-traceable BGI Delta-Cal flow monitor in place of the sampling inlet, and comparing the indicated flow against the target of 16.7 LPM. The check is considered satisfactory if the indicated flow is within +/- 2% of the target value. Otherwise, the flow is adjusted at set points of 14.0 LPM and 17.5 LPM, and the operating flow re-checked.

A successful operating flow rate check, when preceded by a successful leak check, proves that the E-BAM sampler is collecting valid PM_{10} data.

1.1.1.3 Pump Test (E-BAM Manual Section 2.4.1.7)

This test was discontinued during the third quarter of 2009, because experience has shown it to be of little value for indicating when a pump is nearing the end of its operating life.

1.1.1.4 Zero/Span Check (E-BAM Manual Section 2.4.3.1)

Zero and span membrane plates supplied with each sampler are used quarterly to check the calibration of the E-BAM sampler's beta attenuation detector (The manual indicates this check is not required until after 6 months of operation). These plates simulate specific particulate loads when used in conjunction with a blank filter tape. The checks are performed within the E-BAM sampler's "membrane test" menu, which directs the user to install and remove the plates at specified times. At the conclusion of the test, the display screen indicates whether the calibration test was successful. The membrane plates are certified by the manufacturer.

1.1.1.5 Clean Valve and Nozzle (E-BAM Manual Section 2.4.5)

The sampler's sample inlet nozzle (located directly above the filter tape) and vane (located directly beneath the filter tape) are cleaned monthly with a modified Q-tip using isopropyl alcohol. Care is taken that no excess alcohol drips into the vane assembly, which could affect

the unit's calibration. Immediately after performing this maintenance, the leak check described in Section 1.1.1.1 is repeated to ensure that the sample train integrity was not compromised.

1.1.1.6 Clean PM_{10} Inlet (E-BAM Manual Appendix H)

Each month the PM_{10} inlet is removed from the sampler, disassembled and cleaned using paper towels and isopropyl alcohol. Additionally, all o-rings are lubricated with stopcock grease as necessary.

1.1.1.7 Barometric Pressure Sensor Check (E-BAM Manual Section 2.4.1.4)

The E-BAM's internal barometer is checked monthly using a Wallace and Tiernan aneroid barometer that is routinely checked against a mercury wall barometer. If the results agree within +/- 2 mmHg, no adjustment is necessary.

1.1.2 Meteorological Sensors

1.1.2.1 Temperature (E-BAM Manual Section 2.4.1.3)

The E-BAM manual specifies a two-point calibration procedure using an ambient temperature and an ice bath. However, the manufacturer indicated that a single-point field calibration check was generally sufficient. Disassembly of the sensor for placement in an ice bath is not trivial, and is impractical as a routine field activity.

The temperature sensor is checked monthly at ambient conditions using an Assmann Psychrometer that has been certified against an NIST-traceable mercury thermometer. If the readings agree to within 0.5 degrees Celsius, no adjustment is necessary.

1.1.2.2 Relative Humidity (Model 593 Relative Humidity Sensor Operation Manual)

The Model 593 Manual indicates that recalibration (requiring additional specialized equipment) is required only if the sensor element is replaced in the field. For this project, calibration of the relative humidity sensor will be limited to monthly collocated checks using an Assmann Psychrometer that is certified against an NIST-traceable mercury thermometer. Wet-bulb and dry-bulb temperatures, together with ambient barometric pressure, are used with psychrometric tables to calculate a true relative humidity, which is compared against the E-BAM display. If the indicated relative humidity agrees with that obtained by the Assmann psychrometer to within +/- 5% relative humidity, the results are considered acceptable. If consistently unacceptable results are obtained, the relative humidity sensor will be returned to the manufacturer for re-calibration and/or repair.

1.1.2.3 Wind Speed (Model 034B Wind Sensor Operation Manual)

The Model 034B Manual recommends an initial check of the unit's response to a known rotation rate. This is being done monthly in the field using a 300 rpm synchronous motor to produce a known wind speed of 18.49 mph (8.27 m/s). The manual specifies an accuracy of +/- 0.25 mph

(0.11 m/s) at speeds below 22.7 mph (10.1 m/s). Additionally, the response of the sensor when stopped is observed; it should be 0.3 +/- 0.1 m/s.

1.1.2.4 Wind Direction (Model 034B Wind Sensor Operation Manual)

The manual does not specify routine checks for the wind direction sensor, beyond an initial check to confirm that the sensor's readout increases from 0 to 360 degrees as the shaft is turned clockwise. However, routine checks are performed monthly to verify proper operation. First, the sensor's alignment is verified by locking the sensor in place with its alignment pin, and ensuring that a response of between 178 and 182 degrees is obtained. Next, the sensor's linearity is verified by turning it in 90-degree intervals (using the sensor crossarm as a visual reference), and confirming that the E-BAM display's direction indication changes by 90 +/- 3 degrees with each step.

The initial orientation of the sensor was performed using a solar sighting in conjunction with NIST time (WWV) to establish precise direction azimuths. The use of solar sightings – rather than magnetic compass readings – negates any localized magnetic influences.

1.1.2.5 Filter Temperature and Humidity (E-BAM Manual Sections 2.4.2.1 and 2.4.2.2)

The E-BAM Manual includes provisions for adjusting the response of both of these parameters. However, there is no practical way to accurately check either parameter with an external reference standard. Therefore, checks of these parameters will be limited to review of downloaded data files for suspicious behavior.

1.2 Performance Check Results

Each set of performance check results is presented in Appendix D. Results obtained during the Third quarter of 2009 were satisfactory

APPENDIX D

E-BAM PERFORMANCE CHECK RESULTS

OPPORTUNITY SITE

	DATE	7/10/2009	8/20/2009	9/15/2009
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	1303 MST	1302 MST	1403 MST
	EBAM BACK ON-LINE@	1410 MST	1336 MST	1455 MST
	Reason	Monthly checks	Monthly checks	Monthly checks
	Comments	A, B	C, D	E
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	23.5	29.7	26.6
	Audit	23.5	28.7	26.3
Ambient RH Check (+/- 5% RH)	EBAM-Indicated	24%	25%	27%
	Audit (Td/Tw)	23.5 / 11.2	28.7 / 14.9	26.1 / 14.2
	Audit RH	22.4%	23.7%	27.3%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped	0.3	0.3	0.3
	EBAM-Spinning	1.5	1.5	2.4
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated	8.3	8.3	8.3
	Known	8.27	8.27	8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	638.9	637.7	639.9
	Audit	638	637	639
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)	179-180	180	180
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm	155	155	153
	+90 degrees	246	245	243
	+180 degrees	337	334	335
	+270 degrees	67	67	65
	+360 degrees	156	156	153
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	0.8 LPM	1.1 LPM	0.9 LPM
	Leak repaired?	NA	YES	NA
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	17.09	16.79	16.77
	As left (if recalibrated)	16.73	NA	NA
Flow Calibration - Low Flow (if necessary)	As found	14.34	NA	NA
	As left	13.94	NA	NA
Flow Calibration - High Flow (if necessary)	As found	17.67	NA	NA
	As left	17.48	NA	NA
Clean Nozzle (see 2.4.5)	Confirm (X)	X	X	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)	NA	NA	NA
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	0.338 (Pass)	NA	NA
	Span Pass/Fail	0.944 (Pass)	NA	NA
Confirm Leak Check (after maintenance)	Result	0.8 LPM	0.8 LPM	0.8 LPM
	Leak repaired?	NA	NA	NA

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

A = Replaced o-rings for TSP head and PM10 downtube.
B = Wind speed / wind direction done 7-24-2009
C = Didn't adjust temperature due to suny, calm conditions and probable radiation effect.
D = Small bit of tape stuck to bottom surface, removed and cleaned.
E = Wind speed / wind direction done 9-18-2009.

WARM SPRINGS SITE

	DATE	7/10/2009	8/20/2009	9/15/2009
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	1024 MST	1107 MST	1215 MST
	EBAM BACK ON-LINE@	1225 MST	1140 MST	1255 MST
	Reason	Monthly checks	Monthly checks	Monthly checks
	Comments	A, B, C	D	E
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	19.3	25.8	25.4
	Audit	18.5	24.9	25.4
Ambient RH Check (+/- 5% RH)	EBAM-Indicated	34%	32%	31%
	Audit (Td/Tw)	18.5 / 10.0	24.9 / 14.7	25.4 / 14.6
	Audit RH	35.5%	35.1%	32.7%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped	0.3	0.3	0.3
	EBAM-Spinning	2.7	0.8	0.9
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated	8.3	8.3	8.3
	Known	8.27	8.27	8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	642.2	640.6	642.8
	Audit	642	640	642
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)	178	178	179
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm	190	189	189
	+90 degrees	282	281	280
	+180 degrees	9	9	11
	+270 degrees	102	102	101
	+360 degrees	190	190	189
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	0.5 LPM	<0.5 LPM	0.5 LPM
	Leak repaired?	NA	NA	NA
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	16.79	16.68	16.79
	As left (if recalibrated)	NA	NA	NA
Flow Calibration - Low Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Flow Calibration - High Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Clean Nozzle (see 2.4.5)	Confirm (X)	X	X	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)	X	X	X
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	0.359 (Pass)	NA	NA
	Span Pass/Fail	0.957 (Pass)	NA	NA
Confirm Leak Check (after maintenance)	Result	<0.5 LPM	0.5 LPM	0.5 LPM
	Leak repaired?	NA	NA	NA

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

A = Adjusted temperature response
B = Replaced o-rings for PM10 head and downtube
C = Wind speed / wind direction done 7-24-2009
D - Didn't adjust temperature due to sunny, calm conditions and probable radiation effect.
E - Wind speed / wind direction done 9-18-2009.

APPENDIX E

AIR QUALITY SYSTEM NULL DATA QUALIFIER CODES
THIRD QUARTER 2009

Opportunity Site July 2009 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	41	27	19	23	20	19	40	92	42	35	20	20	28	22	36	37	34	47	35	28	34	32	31	21	24	32.6
2	13	30	4	17	25	67	27	35	33	79	46	38	82	93	43	-5	29	31	35	31	45	11	100	-5	24	37.7
3	22	17	35	12	18	6	45	23	39	11	108	AV	33	22	43	53	48	45	31	21	37	22	18	15	23	31.5
4	-5	28	13	9	12	19	20	18	26	18	15	11	35	27	40	17	31	48	35	81	78	49	36	35	24	29.0
5	31	31	26	18	18	14	15	14	8	12	18	13	21	53	25	41	25	44	24	21	43	8	-2	40	24	23.4
6	10	-5	30	12	7	12	10	15	17	8	30	42	58	213	84	58	24	35	23	26	17	21	2	14	24	31.8
7	16	22	5	17	0	26	13	14	15	16	17	56	29	48	61	2	26	52	6	23	-5	30	-5	0	24	20.2
8	2	9	8	5	9	3	14	10	-5	8	14	11	-5	4	15	12	2	7	-5	3	15	-5	1	3	24	5.6
9	4	13	-3	0	0	10	10	2	7	5	27	23	9	26	3	29	10	15	6	5	17	5	20	2	24	10.2
10	5	3	8	-5	13	7	24	-5	16	17	-3	10	6	BA	BA	35	23	41	-2	29	10	28	1	27	22	13.1
11	-3	21	19	1	11	21	46	18	16	10	7	12	14	17	9	15	22	1	29	20	21	40	24	16	24	17.0
12	20	26	24	3	13	46	21	20	29	33	13	76	20	37	-3	-5	18	22	9	17	11	-4	2	-1	24	18.6
13	5	0	-2	-5	20	-5	9	1	7	7	23	9	22	15	100	32	10	12	12	7	0	10	0	2	24	12.1
14	-4	-3	-3	0	11	-5	7	10	29	43	14	14	4	5	1	11	19	26	-3	27	19	12	14	17	24	11.0
15	18	-4	5	17	15	17	23	19	3	18	16	20	19	66	41	21	26	23	16	21	27	18	15	10	24	19.6
16	6	5	6	15	8	21	25	26	42	4	33	21	27	29	29	8	24	25	17	24	43	27	21	41	24	22.0
17	16	5	18	25	29	26	13	45	18	27	19	21	9	19	14	18	15	15	29	33	57	39	21	28	24	23.3
18	8	22	7	13	22	12	40	44	14	36	47	30	32	15	24	16	18	23	48	55	110	30	21	51	24	30.8
19	20	19	12	24	19	23	34	40	29	41	27	31	13	22	41	74	52	59	23	36	82	41	8	21	24	33.0
20	19	20	12	11	1	31	207	196	214	610	82	34	43	45	41	129	488	171	241	56	51	54	17	20	24	116.4
21	9	24	15	16	19	54	126	106	43	72	27	33	31	27	43	34	33	30	19	71	79	54	27	21	24	42.2
22	14	12	14	34	4	26	23	77	32	18	30	26	19	33	26	21	102	40	30	30	30	37	26	24	24	30.3
23	12	35	10	16	20	62	41	46	164	120	40	47	14	18	26	56	39	86	464	84	26	16	95	25	24	65.1
24	30	36	12	11	8	22	79	24	110	80	30	21	20	54	257	85	74	22	29	16	16	56	-5	5	24	45.5
25	31	-5	12	7	15	23	24	7	7	14	22	14	10	48	45	68	15	40	36	32	29	14	11	13	24	22.2
26	7	12	15	-4	-5	37	15	11	10	11	22	20	48	37	20	131	23	45	26	44	11	14	6	12	24	23.7
27	3	3	9	2	-2	15	6	15	0	-4	10	38	88	24	14	17	23	16	22	23	15	3	11	12	24	15.1
28	19	-5	23	1	10	25	14	66	32	17	10	45	18	41	20	-2	8	-1	11	14	9	15	0	38	24	17.8
29	10	-4	6	45	92	29	20	7	2	7	13	30	48	13	4	18	11	24	25	7	25	14	0	23	24	19.5
30	19	11	10	4	14	32	16	8	30	50	28	61	94	74	70	43	16	9	17	40	45	20	17	9	24	30.7
31	9	16	16	7	14	20	16	23	13	8	0	1	17	17	15	70	15	26	9	25	35	18	25	0	24	17.3
NO.	31	31	31	31	31	31	31	31	31	31	31	30	31	30	30	31	31	31	31	31	31	31	31	31		
MAX.	41	36	35	45	92	67	207	196	214	610	108	76	94	213	257	131	488	171	464	84	110	56	100	51		
AVG.	13	14	12	11	15	23	33	33	34	46	26	28	29	39	40	37	42	35	42	31	33	24	18	17		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Opportunity Site August 2009 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-3	19	-4	42	-5	39	4	34	24	22	26	34	67	36	167	59	13	31	32	42	29	30	12	18	24	32.0
2	20	11	13	13	22	24	47	44	23	75	38	33	60	79	49	20	65	37	14	53	20	25	47	45	24	36.5
3	19	12	34	3	19	56	25	51	39	73	64	187	63	29	29	68	38	40	206	69	55	38	28	57	24	54.3
4	7	9	10	19	9	46	19	37	10	22	40	48	47	26	36	63	29	20	33	67	78	32	33	30	24	32.1
5	7	24	9	8	25	45	38	38	18	40	29	74	81	42	62	57	9	AV	25	AV	13	5	3	20	22	30.5
6	-5	14	-2	10	-5	7	4	21	-1	23	9	17	32	49	AV	-5	26	10	9	-5	5	5	8	AV	22	10.3
7	AV	AV	-5	0	4	9	13	4	0	9	17	26	5	19	9	16	6	0	-3	-1	11	9	-5	4	22	6.7
8	21	-5	-2	17	-5	3	3	15	11	3	7	4	10	20	15	4	10	8	9	30	-1	19	14	-3	24	8.6
9	1	12	-3	9	4	14	9	26	5	28	114	62	59	31	29	49	5	29	14	10	7	14	14	16	24	23.3
10	12	8	21	6	22	3	23	17	8	17	20	28	35	18	29	19	18	32	26	35	12	22	6	22	24	19.1
11	2	26	2	12	22	20	21	23	14	27	35	33	30	34	42	29	55	233	15	34	29	15	18	13	24	32.7
12	17	-4	20	5	6	18	24	17	29	14	45	49	58	50	32	44	32	141	84	19	14	16	10	4	24	31.0
13	-5	7	18	9	8	27	39	9	15	36	23	35	37	80	181	133	86	5	3	-3	9	16	-5	16	24	32.5
14	3	3	11	-1	2	2	19	3	4	-4	26	13	51	-5	34	-5	-5	-5	11	-5	8	10	-4	-1	24	6.9
15	3	6	2	19	19	3	2	6	7	2	1	7	4	8	12	37	-5	1	10	-5	3	-5	11	2	24	6.3
16	-5	11	13	4	25	-5	8	16	-5	7	21	0	7	16	-3	10	5	-4	16	-5	3	3	0	3	24	5.9
17	17	-5	-5	8	-2	6	11	3	12	-5	9	12	16	29	23	4	19	10	6	6	7	2	15	-2	24	8.2
18	5	-2	14	3	11	11	10	4	13	14	27	25	41	37	25	22	24	16	21	27	19	15	8	20	24	17.1
19	12	11	13	19	26	53	23	28	27	31	29	39	33	40	35	29	27	29	23	13	37	29	10	-4	24	25.5
20	38	15	4	9	6	50	34	16	22	54	24	23	13	BA	19	13	20	26	32	64	29	21	25	34	23	25.7
21	4	9	24	17	19	24	46	9	23	48	61	39	30	24	39	32	28	26	25	18	24	21	16	13	24	25.8
22	10	4	15	9	19	2	42	23	19	27	48	32	23	25	19	19	33	27	18	15	26	38	21	29	24	22.6
23	-1	21	10	2	52	51	23	70	29	17	17	17	50	67	149	106	25	-5	9	6	6	5	7	-3	24	30.4
24	4	25	0	17	4	43	7	21	8	11	10	18	BA	BA	54	17	17	8	25	29	18	10	20	-3	22	16.5
25	21	16	5	14	11	16	11	23	32	18	18	17	25	35	17	23	41	20	25	26	8	21	10	20	24	19.7
26	18	-3	11	13	15	17	36	55	45	35	48	29	48	35	26	19	24	41	25	26	26	28	24	22	24	27.6
27	10	22	12	16	14	29	35	54	41	23	30	31	29	41	49	28	26	14	12	36	32	16	10	16	24	26.1
28	-4	26	5	13	6	20	20	49	40	42	27	34	31	30	75	46	26	40	40	35	38	24	17	26	24	29.4
29	22	12	13	11	11	16	30	16	58	31	30	31	24	26	29	41	35	31	32	25	27	54	28	19	24	27.2
30	22	17	22	17	20	5	41	14	19	20	23	30	25	24	19	26	23	35	107	44	25	242	10	12	24	35.1
31	0	12	6	-5	8	1	16	35	23	5	7	14	12	6	15	10	10	7	10	11	-5	18	5	-5	24	9.0
NO.	30	30	31	31	31	31	31	31	31	31	31	31	30	29	30	31	31	30	31	30	31	31	31	30		
MAX.	38	26	34	42	52	56	47	70	58	75	114	187	81	80	181	133	86	233	206	69	78	242	47	57		
AVG.	9	11	9	11	13	21	22	25	20	25	30	34	35	33	44	33	25	30	29	24	20	26	13	15		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Opportunity Site September 2009 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	18	-5	16	10	13	-5	13	19	22	19	14	19	10	12	10	15	14	15	18	7	10	6	17	8	24	12.3
2	-5	-1	18	5	9	11	13	16	19	29	31	44	19	22	34	32	24	20	17	27	14	19	14	4	24	18.1
3	10	19	5	7	9	18	24	29	27	47	23	36	43	56	51	79	36	26	36	47	18	30	34	33	24	31.0
4	35	28	29	-3	17	27	32	22	22	24	110	83	36	41	45	13	43	29	14	35	37	26	12	19	24	32.3
5	14	16	2	12	16	17	30	35	24	42	21	49	34	68	38	24	11	37	42	28	50	38	-5	15	24	27.4
6	26	12	-5	12	4	-5	17	47	28	15	10	27	27	303	101	135	63	72	34	34	28	24	11	37	24	44.0
7	27	4	17	0	13	3	19	20	9	32	139	34	13	110	66	39	38	42	25	11	12	9	4	1	24	28.6
8	-2	12	1	-5	8	17	4	14	5	13	14	28	22	22	14	13	8	38	22	5	18	13	5	0	24	12.0
9	6	5	2	7	1	7	16	34	43	25	38	44	14	16	29	57	58	32	12	24	17	10	12	9	24	21.6
10	4	11	6	7	3	30	25	24	13	21	31	46	99	158	102	39	25	136	19	51	28	22	24	13	24	39.0
11	18	17	12	25	7	59	54	52	25	30	21	39	49	44	37	33	18	29	17	42	52	14	39	-2	24	30.5
12	16	10	6	13	6	11	25	25	26	31	19	32	31	23	25	25	108	236	43	39	12	23	10	14	24	33.7
13	18	5	12	37	-5	21	32	20	14	21	14	8	18	7	15	13	12	20	17	24	22	11	6	5	24	15.3
14	6	11	2	16	10	30	28	29	40	27	90	63	164	74	138	57	49	63	20	22	20	28	10	16	24	42.2
15	14	-1	17	30	1	16	7	47	27	20	40	48	42	38	BA	28	28	27	27	58	32	28	19	33	23	27.2
16	3	6	10	22	0	36	26	17	66	23	25	25	34	25	12	29	-4	22	32	22	20	12	10	17	24	20.4
17	10	9	17	6	11	12	12	32	28	23	14	37	53	48	32	26	64	44	205	32	31	25	23	20	24	33.9
18	23	13	5	41	10	24	45	56	14	30	26	129	136	130	91	16	21	30	22	45	28	38	11	10	24	41.4
19	11	8	10	18	26	32	32	36	21	38	36	35	38	40	49	46	33	42	95	56	36	80	35	2	24	35.6
20	24	20	17	20	12	10	9	26	66	63	36	60	52	21	24	67	15	15	15	16	8	10	8	0	24	25.6
21	0	7	-5	6	4	26	-2	19	9	18	12	5	11	46	32	50	27	40	38	22	11	18	11	4	24	17.0
22	12	5	14	10	-2	32	49	5	25	22	17	33	15	20	23	12	11	12	29	23	19	14	12	15	24	17.8
23	11	2	-5	21	7	9	8	13	44	51	73	67	74	51	34	10	4	20	35	32	47	11	20	1	24	26.7
24	12	-1	16	6	14	6	43	27	39	36	25	63	88	63	89	27	11	23	41	54	36	19	19	20	24	32.3
25	9	17	27	11	15	13	28	50	59	45	60	65	55	51	38	27	27	23	28	27	22	20	28	20	24	31.9
26	19	20	25	22	27	13	16	35	42	31	52	42	50	151	74	88	85	87	138	167	222	186	94	67	24	73.0
27	70	77	42	31	19	49	43	36	40	47	192	62	92	174	49	45	43	335	35	41	24	30	15	22	24	67.2
28	15	3	16	20	31	57	52	50	156	131	75	92	54	58	36	25	28	19	44	33	36	34	17	22	24	46.0
29	17	3	17	12	50	53	91	83	83	116	159	130	112	279	98	83	128	56	44	24	82	14	10	4	24	72.8
30	2	2	-3	31	-5	20	-3	17	32	14	10	18	6	11	14	13	14	4	17	2	3	12	9	7	24	10.3
NO.	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30	30	30	30		
MAX.	70	77	42	41	50	59	91	83	156	131	192	130	164	303	138	135	128	335	205	167	222	186	94	67		
AVG.	15	11	11	15	11	22	26	31	36	36	48	49	50	72	48	39	35	53	39	35	33	27	18	15		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Warm Springs Site July 2009 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	6	10	6	-5	20	-5	18	33	17	19	18	21	20	13	9	11	11	6	12	9	-3	0	3	3	24	10.5
2	20	3	-4	24	9	9	-1	26	31	19	19	12	25	2	7	11	12	12	3	15	1	-5	17	36	24	12.6
3	-5	5	35	-4	-3	29	2	-1	28	19	12	12	11	4	4	-1	15	9	0	5	9	9	2	12	24	8.7
4	-5	11	24	-5	10	11	11	14	23	7	5	3	14	4	9	-1	18	-2	-1	4	-4	-1	12	2	24	6.8
5	6	22	9	11	4	10	4	22	18	8	13	10	9	-5	-3	8	7	27	9	8	5	-5	12	0	24	8.7
6	20	-5	7	7	4	-2	15	13	7	4	7	5	6	10	14	1	21	24	4	20	10	-5	6	9	24	8.4
7	11	11	19	-5	7	11	15	9	16	8	14	12	4	15	3	3	13	10	-2	2	-2	19	-2	14	24	8.5
8	15	-5	11	6	8	4	2	11	5	10	12	-5	16	3	28	-5	17	-5	4	11	0	-5	1	1	24	5.8
9	5	-2	-1	21	-5	-2	22	1	19	8	9	5	4	12	0	3	4	6	2	8	-5	-5	0	-5	24	4.3
10	-2	18	-5	6	3	0	17	11	12	4	BA	BA	BA	9	3	6	5	6	2	2	2	-5	14	9	21	5.6
11	-3	22	-3	16	-2	30	-1	9	22	16	12	10	9	0	6	8	9	7	11	-5	16	7	-1	6	24	8.4
12	6	14	-3	17	6	16	1	42	18	6	15	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	11	12.5
13	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	0	#DIV/0!
14	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	0	#DIV/0!
15	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	AV	6	4	2	2	0	-3	-5	-5	11	9	1.3
16	7	2	15	-2	9	13	6	36	22	21	15	11	6	9	-1	11	2	3	2	11	-3	-5	2	6	24	8.3
17	12	9	11	10	13	16	12	44	19	20	20	10	3	5	7	15	9	7	14	10	0	-5	8	14	24	11.8
18	12	8	12	12	16	3	15	34	32	27	21	10	16	-3	1	9	0	8	15	11	-5	-5	10	10	24	11.2
19	15	15	22	3	12	15	18	45	18	24	13	9	20	10	14	5	2	4	6	0	-5	1	-5	13	24	11.4
20	-5	18	16	6	10	5	2	54	36	19	12	6	16	12	12	1	5	3	8	5	-5	-1	5	14	24	10.6
21	8	4	14	10	17	2	22	35	38	19	18	16	5	10	1	7	5	11	8	11	-1	-5	8	8	24	11.3
22	9	11	19	13	19	19	15	42	28	21	12	11	9	6	4	1	5	8	6	21	0	-5	18	6	24	12.4
23	12	12	13	16	10	18	21	44	31	26	19	15	5	1	-5	7	10	6	15	19	4	1	13	2	24	13.1
24	9	5	19	-5	10	-5	20	24	25	23	23	15	14	12	9	19	12	33	11	9	7	4	6	12	24	13.0
25	3	0	14	3	8	26	3	20	8	11	5	4	6	-2	-3	-5	17	4	6	-1	3	4	5	-5	24	5.6
26	4	8	10	1	12	-5	12	13	9	20	7	10	-5	4	5	25	-5	9	-4	-4	4	14	6	10	24	6.7
27	2	9	3	8	0	-5	3	15	7	-5	14	-3	13	7	6	21	8	26	4	23	-5	14	17	13	24	8.1
28	8	18	14	4	13	9	22	13	12	8	18	15	-5	35	6	6	13	-5	10	9	8	3	14	-3	24	10.2
29	41	110	136	54	40	-5	31	-5	10	-2	7	6	9	14	2	2	8	9	0	-2	-2	11	9	-4	24	20.0
30	26	-4	14	8	12	15	22	17	23	23	19	7	7	12	11	3	2	2	4	5	-3	-5	7	7	24	9.8
31	12	12	8	12	19	14	14	4	24	-2	1	12	9	7	5	0	2	12	-1	3	-5	2	13	4	24	7.5
NO.	28	28	28	28	28	28	28	28	28	28	27	26	26	27	27	28	28	28	28	28	28	28	28	28		
MAX.	41	110	136	54	40	30	31	54	38	27	23	21	25	35	28	25	21	33	15	23	16	19	18	36		
AVG.	9	12	16	9	10	9	12	22	20	14	13	9	9	8	6	6	8	9	5	7	1	1	7	7		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Warm Springs Site August 2009 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	5	10	-2	0	11	1	15	17	20	12	19	20	6	19	2	13	8	-2	18	7	-5	5	12	7	24	9.1
2	10	9	18	11	12	9	11	29	13	25	21	27	11	11	10	28	6	-5	18	4	-5	-2	13	14	24	12.4
3	1	15	9	13	12	17	13	34	26	18	33	27	17	25	18	22	9	20	23	15	0	19	22	24	24	18.0
4	10	3	15	12	6	14	17	31	22	17	21	17	8	9	105	3	-1	9	9	-4	1	13	-2	21	24	14.8
5	7	6	19	-5	18	2	25	7	22	24	23	1	26	10	17	12	1	23	6	16	1	1	12	13	24	12.0
6	-1	12	-5	-1	17	-5	0	13	6	18	3	1	15	-5	-1	-5	21	7	-5	8	8	-1	5	0	24	4.4
7	-4	8	2	6	0	4	19	-5	15	0	16	12	7	-5	8	7	10	5	5	-5	6	15	5	-5	24	5.3
8	23	-5	-5	17	-1	2	4	21	-5	23	6	3	9	8	1	5	13	-5	-1	13	-5	12	15	-5	24	6.0
9	2	7	25	22	12	7	7	25	16	11	23	16	10	24	7	22	-5	23	18	0	18	11	16	5	24	13.4
10	16	11	15	6	20	9	33	24	14	18	19	10	6	8	9	35	56	11	8	6	-5	-2	11	10	24	14.5
11	10	1	3	19	21	12	31	23	22	21	21	14	12	9	7	14	2	25	11	5	0	7	4	8	24	12.6
12	-5	5	-2	27	-3	2	15	14	19	19	11	19	16	7	6	11	10	10	10	7	4	1	-5	13	24	8.8
13	2	3	12	15	8	10	-5	29	17	5	15	15	11	17	9	1	9	-2	-2	-5	14	16	-2	-5	24	7.8
14	2	16	-2	8	-5	12	22	-3	4	6	-2	13	-5	10	3	0	-3	2	9	2	0	8	-5	4	24	4.0
15	8	3	-2	5	7	20	-2	12	6	4	7	-5	12	6	1	13	-5	0	-3	-4	-5	3	3	-2	24	3.4
16	7	-5	4	10	0	8	-2	4	-5	19	2	4	2	5	-5	6	-5	29	4	-5	18	-5	-5	4	24	3.7
17	-2	4	2	2	-2	2	-1	14	2	13	6	9	9	0	-1	5	3	0	2	-5	-4	-2	1	17	24	3.1
18	3	-5	7	5	19	4	3	6	15	9	22	12	16	18	6	13	12	13	13	14	-4	15	8	4	24	9.5
19	17	8	18	8	12	14	3	20	16	20	19	10	18	8	5	12	10	11	6	-3	-1	7	7	22	24	11.1
20	19	14	12	11	3	19	15	12	16	22	10	BA	30	7	8	7	0	13	9	8	-4	1	24	50	23	13.3
21	18	6	27	-2	16	14	9	23	18	25	17	19	12	6	10	-5	11	-5	8	-4	9	13	2	16	24	11.0
22	28	4	25	-1	3	17	25	2	23	21	14	16	19	14	14	9	7	5	12	-3	1	8	3	31	24	12.4
23	-5	13	25	7	9	14	5	25	6	9	16	17	13	3	20	14	-2	5	11	3	7	5	9	1	24	9.6
24	6	15	2	12	10	-3	19	8	9	14	19	20	8	13	8	5	12	6	3	-5	-5	14	2	33	24	9.4
25	3	5	18	14	8	2	14	9	27	16	13	21	6	3	7	-1	15	18	6	-5	0	9	-5	20	24	9.3
26	17	11	18	-3	12	18	14	13	10	17	15	10	11	9	12	8	3	2	2	1	-3	24	4	24	24	10.4
27	18	18	6	3	18	14	17	20	28	31	25	27	9	11	8	6	3	9	10	-5	13	11	9	35	24	14.3
28	12	14	11	12	5	5	9	10	17	20	21	11	7	17	24	1	12	16	12	-5	5	9	20	23	24	12.0
29	15	10	21	7	11	24	7	14	14	18	27	9	12	16	13	7	15	15	14	11	20	10	22	15	24	14.5
30	14	7	17	11	3	15	27	-1	16	18	14	24	11	12	12	7	1	14	0	1	2	10	1	20	24	10.7
31	6	6	2	14	1	12	-5	9	1	9	10	10	-2	11	13	-5	10	3	2	8	3	-5	12	13	24	5.8
NO.	31	31	31	31	31	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31		
MAX.	28	18	27	27	21	24	33	34	28	31	33	27	30	25	105	35	56	29	23	16	20	24	24	50		
AVG.	8	7	10	9	8	10	12	15	14	16	16	14	11	10	11	9	8	9	8	2	3	7	7	14		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Warm Springs Site September 2009 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	11	-5	16	13	-5	4	3	28	1	16	15	12	7	10	1	6	4	-5	3	-5	7	2	10	10	24	6.6
2	7	11	10	14	-5	-1	21	4	19	12	9	6	6	6	5	-5	13	-3	9	-5	-5	2	8	20	24	6.6
3	11	9	10	-4	9	10	2	13	11	26	12	13	4	9	6	20	1	5	-1	8	-4	16	16	18	24	9.2
4	3	15	15	7	19	9	23	14	23	22	15	19	15	9	6	2	1	0	5	-5	0	11	5	18	24	10.5
5	13	-2	14	-5	27	0	20	7	23	10	23	11	12	7	23	-5	6	20	1	5	-1	7	2	18	24	9.8
6	9	-1	15	0	6	6	19	6	14	10	20	11	7	5	21	19	17	23	15	14	10	3	10	8	24	11.1
7	6	3	14	3	4	8	-3	16	5	10	4	14	4	7	5	9	11	-5	13	-5	0	-3	2	31	24	6.4
8	-5	23	-5	4	-3	-5	2	5	5	4	10	6	6	6	6	3	3	8	-2	-5	1	1	4	10	24	3.4
9	11	2	1	5	0	4	-2	13	12	16	11	9	5	1	5	10	-3	-5	-2	3	-3	0	7	17	24	4.9
10	5	6	2	-5	16	9	-3	16	11	18	24	6	14	6	11	8	1	11	0	-5	-1	8	10	23	24	8.0
11	1	15	4	19	23	25	23	7	31	20	15	10	14	10	8	7	4	9	22	-5	7	9	10	10	24	12.4
12	19	5	9	0	14	8	0	8	12	14	18	6	10	9	-5	11	0	6	13	-5	7	2	9	19	24	7.9
13	7	0	8	3	-3	3	12	-2	13	10	18	12	-2	8	5	4	5	4	0	3	6	5	1	20	24	5.8
14	10	5	5	13	4	-1	8	21	26	13	21	21	11	16	14	8	12	6	4	-2	9	5	10	23	24	10.9
15	7	3	12	22	9	28	-1	17	19	17	18	11	BA	48	17	11	8	22	17	0	19	10	13	17	23	15.0
16	18	2	-1	3	31	4	6	16	15	26	21	3	5	7	8	4	3	8	8	2	-5	2	12	20	24	9.1
17	2	9	6	17	3	-1	13	14	17	14	10	3	15	-4	11	2	25	14	21	11	8	20	4	35	24	11.2
18	7	13	2	12	18	8	25	165	54	23	17	25	15	10	12	9	4	2	18	-3	12	16	5	20	24	20.4
19	10	0	12	15	11	7	11	9	17	21	14	4	16	5	11	6	0	39	11	14	14	10	19	8	24	11.8
20	2	14	-5	9	-3	4	14	-4	0	14	17	8	-2	8	-2	20	5	2	2	-1	4	2	7	14	24	5.4
21	-5	8	-5	8	0	0	1	13	6	8	16	7	7	15	7	5	0	16	-4	0	7	2	2	6	24	5.0
22	20	-3	-2	10	6	18	4	0	10	18	14	8	14	0	12	2	5	-5	-5	-3	6	10	9	21	24	7.0
23	0	13	4	3	6	4	15	8	14	21	24	10	8	7	17	-5	-5	21	-5	-5	1	16	-5	19	24	7.8
24	2	5	10	5	6	7	5	-1	19	16	17	23	8	12	11	11	4	4	9	-5	5	14	15	26	24	9.5
25	20	12	20	13	12	14	16	9	41	37	21	21	AV	AV	AV	23	18	7	-3	-3	3	-1	12	27	21	15.2
26	6	21	16	14	12	15	21	6	21	23	20	18	14	17	12	17	4	2	-5	6	6	7	23	23	24	13.3
27	25	15	15	12	8	15	24	13	21	16	34	21	29	34	32	22	17	6	13	21	16	13	13	25	24	19.2
28	18	14	19	6	33	8	17	54	16	26	20	12	15	14	11	4	1	13	-4	6	17	11	13	6	24	14.6
29	14	5	6	9	22	15	16	42	23	38	40	37	25	23	18	53	21	24	4	34	3	13	15	-5	24	20.6
30	-5	9	1	2	8	-3	8	9	7	-5	9	7	2	9	9	-5	3	11	-5	15	-4	6	6	5	24	4.1
NO.	30	30	30	30	30	30	30	30	30	30	30	30	28	29	29	30	30	30	30	30	30	30	30	30		
MAX.	25	23	20	22	33	28	25	165	54	38	40	37	29	48	32	53	25	39	22	34	19	20	23	35		
AVG.	8	8	8	8	10	7	11	18	17	17	18	12	10	11	10	9	6	9	5	3	5	7	9	17		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Qualifier Codes and Descriptions

as of 12-APR-07

Qualifier Type	Qualifier Type Desc	Qualifier Code	Qualifier Desc
EX	Exceptional Event Qualifier	D	SANDBLASTING
		F	STRUCTURAL FIRE
		H	CHEMICAL SPILLS & INDUST. ACCIDENTS
		I	UNUSUAL TRAFFIC CONGESTION
		J	CONSTRUCTION/DEMOLITION
		K	AGRICULTURAL TILLING
		L	HIGHWAY CONSTRUCTION
		M	REROUTING OF TRAFFIC
		N	SANDING/SALTING OF STREETS
		O	INFREQUENT LARGE GATHERINGS
		P	ROOFING OPERATIONS
		Q	PRESCRIBED BURNING
		R	CLEAN UP AFTER A MAJOR DISASTER
NAT	Natural Event Qualifier	A	HIGH WINDS
		B	STRATOSPHERIC OZONE INTRUSION
		C	VOLCANIC ERUPTIONS
		E	FOREST FIRE
		G	HIGH POLLEN COUNT
		S	SEISMIC ACTIVITY
		U	SAHARA DUST
NULL	Null Data Qualifier	AA	SAMPLE PRESSURE OUT OF LIMITS
		AB	TECHNICIAN UNAVAILABLE
		AC	CONSTRUCTION/REPAIRS IN AREA
		AD	SHELTER STORM DAMAGE
		AE	SHELTER TEMPERATURE OUTSIDE LIMITS
		AF	SCHEDULED BUT NOT COLLECTED
		AG	SAMPLE TIME OUT OF LIMITS
		AH	SAMPLE FLOW RATE OUT OF LIMITS
		AI	INSUFFICIENT DATA (CANNOT CALCULATE)
		AJ	FILTER DAMAGE
		AK	FILTER LEAK
		AL	VOIDED BY OPERATOR
		AM	MISCELLANEOUS VOID
		AN	MACHINE MALFUNCTION
		AO	BAD WEATHER
		AP	VANDALISM
		AQ	COLLECTION ERROR
		AR	LAB ERROR
		AS	POOR QUALITY ASSURANCE RESULTS
		AT	CALIBRATION
		AU	MONITORING WAIVED
		AV	POWER FAILURE (POWR)
		AW	WILDLIFE DAMAGE
		AX	PRECISION CHECK (PREC)
		AY	Q C CONTROL POINTS (ZERO/SPAN)
		AZ	Q C AUDIT (AUDT)

		BA	MAINTENANCE/ROUTINE REPAIRS
		BB	UNABLE TO REACH SITE
		BC	MULTI-POINT CALIBRATION
		BD	AUTO CALIBRATION
		BE	BUILDING/SITE REPAIR
		BF	PRECISION/ZERO/SPAN
		BG	Missing ozone data not likely to exceed level of standard
		BH	Interference/co-elution
		BI	Lost or damaged in transit
		BJ	Operator Error
		BK	Site computer/data logger down
		SA	Storm Approaching
QA	Quality Assurance Qualifier	1	Deviation from a CFR/Critical Criteria Requirement
		2	Operational Deviation
		3	Field Issue
		4	Lab Issue
		5	Outlier
		6	QAPP Issue
		7	Below Lowest Calibration Level
		9	Negative value detected - zero reported
		MD	Value between MDL and IDL
		ND	No Value Detected
		SQ	Values Between SQL and MDL
		V	VALIDATED VALUE
		W	FLOW RATE AVERAGE OUT OF SPEC.
		X	FILTER TEMPERATURE DIFFERENCE OUT OF SPEC.
		Y	ELAPSED SAMPLE TIME OUT OF SPEC.

ATTACHMENT 1

LABORATORY ANALYTICAL REPORTS

Note: Non-applicable portions of laboratory reports have been excluded.

Monday, November 30, 2009

Analytical Laboratory

Steve Heck
Kuipers & Associates, LLC
P.O. Box 641
Butte, MT 59703

RE: DUSTFALL BUCKETS

Work Order: 0910015

Dear Steve Heck:

MSE Lab Services received 3 sample(s) on 10/1/2009 for the analyses presented in the following report.

Please find enclosed analytical results for the sample(s) received at the MSE Laboratory.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Marcee Cameron

Marcee Cameron
Laboratory Director/ Chemist
406-494-7371

Enclosure

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

E-MAILED
11/30 MC

MSE Lab Services

Date: *30-Nov-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0910015
Project: DUSTFALL BUCKETS
Lab ID: 0910015-001

Client Sample ID: KA-SP-OPP-4-49133
Collection Date: 9/18/2009 11:55:00 AM
Matrix: FILTER

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **SW**
Arsenic	37.3	0.356	1.23		mg/Kg	1	11/6/2009
Cadmium	1.00	0.022	0.082		mg/Kg	1	11/6/2009
Copper	151	0.336	1.02		mg/Kg	1	11/6/2009
Lead	27.7	0.037	0.164		mg/Kg	1	11/6/2009
Zinc	149	0.749	2.46		mg/Kg	1	11/6/2009
FILTER & SAMPLE WEIGHT - FILTER ANALYSIS			**MISC**				Analyst: **BO**
Sample/Filter Weight	0.0610	0.0001	0.0001		g	1	11/5/2009

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE-TA Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

MSE Lab Services

Date: *30-Nov-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0910015
Project: DUSTFALL BUCKETS
Lab ID: 0910015-002

Client Sample ID: KA-SP-OPP-4-49417
Collection Date: 9/18/2009 11:55:00 AM
Matrix: FILTER

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **SW**
Arsenic	25.3	0.361	1.24		mg/Kg	1	11/6/2009
Cadmium	0.595	0.022	0.083		mg/Kg	1	11/6/2009
Copper	95.8	0.340	1.04		mg/Kg	1	11/6/2009
Lead	17.5	0.037	0.166		mg/Kg	1	11/6/2009
Zinc	91.7	0.758	2.49		mg/Kg	1	11/6/2009
FILTER & SAMPLE WEIGHT - FILTER ANALYSIS			**MISC**				Analyst: **BO**
Sample/Filter Weight	0.0603	0.0001	0.0001		g	1	11/5/2009

Review

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *30-Nov-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0910015
Project: DUSTFALL BUCKETS
Lab ID: 0910015-003

Client Sample ID: KA-SP-WS-4-49038
Collection Date: 9/18/2009 11:11:00 AM
Matrix: FILTER

Analyses	Result	MDL	Rpt Limit	Qualifier	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **SW**
Arsenic	20.4	0.266	0.918		mg/Kg	1	11/6/2009
Cadmium	0.914	0.016	0.061		mg/Kg	1	11/6/2009
Copper	89.1	0.251	0.765		mg/Kg	1	11/6/2009
Lead	23.2	0.028	0.122		mg/Kg	1	11/6/2009
Zinc	132	0.559	1.84		mg/Kg	1	11/6/2009
FILTER & SAMPLE WEIGHT - FILTER ANALYSIS			**MISC**				Analyst: **BO**
Sample/Filter Weight	0.0817	0.0001	0.0001		g	1	11/5/2009

Review

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 30-Nov-09
Report Date: 30-Nov-09

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS
Work Order: 0910015
BatchID: 2827

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***2827-PB-UNFILTERED***			*Method:* ***SW6020***		*Batch ID:* ***2827***			*Analysis Date:* ***11/6/2009***		
Arsenic	ND	0.150	mg/Kg							
Cadmium	ND	0.010	mg/Kg							
Copper	ND	0.125	mg/Kg							
Lead	ND	0.020	mg/Kg							
Zinc	ND	0.300	mg/Kg							
Sample ID: ***2827-PB-FILTERED***			*Method:* ***SW6020***		*Batch ID:* ***2827***			*Analysis Date:* ***11/6/2009***		
Arsenic	ND	0.150	mg/Kg							
Cadmium	ND	0.010	mg/Kg							
Copper	ND	0.125	mg/Kg							
Lead	ND	0.020	mg/Kg							
Zinc	0.110	0.300	mg/Kg							
Sample ID: ***2827-LCS***			*Method:* ***SW6020***		*Batch ID:* ***2827***			*Analysis Date:* ***11/6/2009***		
Arsenic	65.6	0.148	mg/Kg	69.87	93.9	80	120			
Cadmium	206	0.010	mg/Kg	212.8	97.0	80	120			
Copper	165	0.124	mg/Kg	176.2	93.7	80	120			
Lead	78.5	0.020	mg/Kg	84.03	93.5	80	120			
Zinc	598	0.297	mg/Kg	649.2	92.0	80	120			
Sample ID: ***0910015-001AMS***			*Method:* ***SW6020***		*Batch ID:* ***2827***			*Analysis Date:* ***11/6/2009***		
Arsenic	50.9	1.23	mg/Kg	16.39	82.7	75	125			
Cadmium	19.1	0.082	mg/Kg	20.49	88.1	75	125			
Copper	231	1.02	mg/Kg	102.5	77.1	75	125			
Lead	35.7	0.164	mg/Kg	8.197	97.4	75	125			
Zinc	331	2.46	mg/Kg	204.9	89.1	75	125			
Sample ID: ***0910015-001AMSD***			*Method:* ***SW6020***		*Batch ID:* ***2827***			*Analysis Date:* ***11/6/2009***		
Arsenic	51.2	1.23	mg/Kg	16.39	84.5	75	125	0.604	20	
Cadmium	18.9	0.082	mg/Kg	20.49	87.3	75	125	0.924	20	
Copper	232	1.02	mg/Kg	102.5	79.0	75	125	0.825	20	
Lead	35.5	0.164	mg/Kg	8.197	95.1	75	125	0.527	20	
Zinc	328	2.46	mg/Kg	204.9	87.5	75	125	1.02	20	

Review

Qualifiers:
NA Sample conc. Is > 4*spike level
S Spike Recovery outside accepted recovery limits

FORM MSE-169
(Init. 06/06)

MSE Technology Applications, Inc.
Laboratory Services

CHAIN OF CUSTODY

PROJECT ID: Kuipers and Associates

LABORATORY PERFORMING ANALYSIS:

SAMPLERS (Signature): Steven R Heck

ANALYSIS REQUESTED: Net Particulate; As, Cd, Cu, Pb, Zn

REMARKS

Turnaround Time (TAT)

☒ Standard TAT

☐ Rush TAT (please contact laboratory personnel for arrangements)

SAMPLE ID	LAB ID	DATE	TIME	Net Particulate	As, Cd, Cu, Pb, Zn	REMARKS
KA-SP-OPP-4-49133	0910015-001A	9-18-09	1155	X	X	7-11-09 to 9-18-09 (N)
KA-SP-OPP-4-49417	002A	9-18-09	1155	X	X	7-11-09 to 9-18-09 (S)
KA-SP-WS-4-49038	003A	9-1809	1111	X	X	7-11-09 to 9-18-09

RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
Steven R Heck	9-30-09	1407	Debbie Ortega	9-30-09	14:07
PRINTED NAME: Steven R. Heck	COMPANY: Blacktail Cons		PRINTED NAME: Debbie Ortega	COMPANY: MSE TA LAB	
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY	
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY	

COMMENTS: Please contact Steve Heck 498-4199 when ready to weigh filters.

MSE LABORATORY SERVICES
200 Technology Way, P.O. Box 4078
Butte, MT 59701
PH: (406) 494-7334 / FAX: (406) 494-7230

hand delivered
Temp = N/A (solid)
No cooler ice

MSE Lab Services

Sample Receipt Checklist

Client Name **KUIPERS&ASSOC** Date and Time Received: **10/1/2009 3:01:03 PM**

Work Order Number **0910015** RcptNo: **1** Received by **DO**

COC_ID: CoolerID:

Checklist completed by Signature Date Reviewed by Initials Date

Matrix: Carrier name: Hand-Delivered

Shipping container/cooler in good condition?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Water - VOA vials have zero headspace?	No VOA vials submitted ☑	Yes ☐	No ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Blank ☐

NA - filters

Adjusted? Checked by

Any No and/or NA (not applicable) response must be detailed in the comments section bel

Client contacted: Date contacted: Person contacted

Contacted by: Regarding:

Comments: NO COOLER/ICE. TEMP=N/A(SOLID)

Corrective Action